The IRON AGE

MAY 22, 1941

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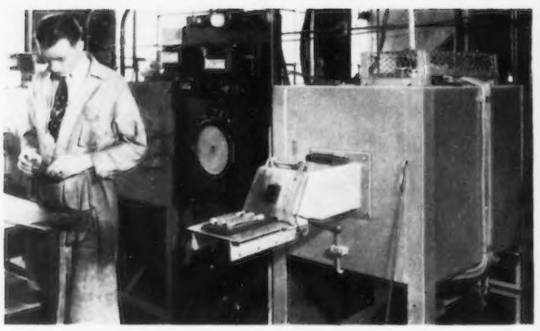

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This Week in The Iron Age

MAY 22, 1941

VOL. 147, NO. 21

Member, Audit Bureau of Circulations
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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year. Single copy, 25 cents.
Cable Address "Ironage, N. Y."

Owned and Published by
CHILTON COMPANY
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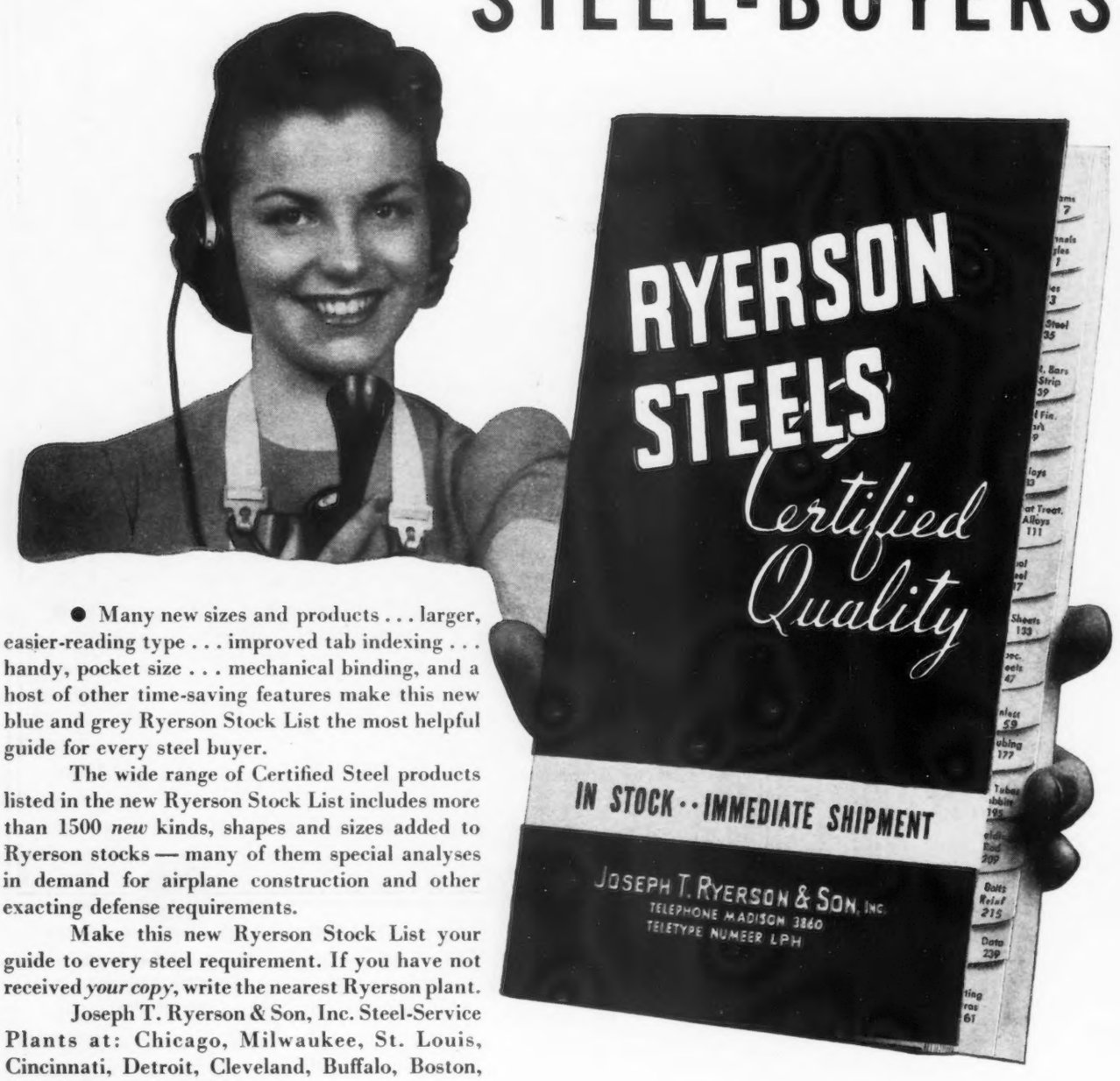

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The Iron Age

MAY 22, 1941

ESTABLISHED 1855

Feeding the Elephant

MARS has an insatiable appetite for durable goods. He eats steel and machinery like nobody's business. Our industry has to feed him and in so doing we have to place at the second table those to whom we have normally issued meal tickets. Which reminds me of a story.

Once upon a time there was an elephant that became afflicted with elephantiasis.

Elephantiasis, as you know, is a disease that causes inordinate growth in certain parts of the body. Under the impact of this affliction, physical proportions and ratios are amazingly altered.

This elephant, to which I have referred, suffered from elephantiasis of the legs. They grew and grew. They grew so fast that pretty soon he found that his trunk was no longer able to reach the ground. But his legs still continued to grow until this vital organ became so relatively short that he could not feed himself without assistance.

However, this did not immediately interfere with his nourishment, since the inhabitants of his country, having a pressing need for elephants at that time, commissioned the government to feed him from a stepladder.

But after a time, this crying need of theirs for elephants passed. And so our long legged friend found himself in a dilemma. Either he would have to grow a longer trunk, or have his legs cut off.

Now an elephant with amputated legs is not much of an elephant. He cannot get around very well under such circumstances and his overhead becomes too heavy for what is left of his legs to carry. So this elephant chose the alternative way out of his dilemma. He determined to lengthen his fodder purveyor. And I am happy to report that through a carefully selected diet of B_1 pills, ironized yeast and vitaminized bamboo shoots, he finally succeeded in making his trunk match his elongated legs.

The analogy of his experience to ours is, I think, quite clear. Our expanded productive capacity corresponds to the elephant's lengthened legs. Our merchandising power corresponds to his trunk. Today government, not sales effort, is feeding the metal working elephant from a stepladder.

Some day we will have to face the alternative of shortening the legs or lengthening the trunk. I think we will choose the latter. There is plenty of B_1 in better new products, ironized yeast in new merchandising ideas and all sorts of growth vitamins in cost and price reduction.

Better be thinking about where to look for these trunk growers before the stepladder is removed.

J. H. Van Deventer

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Basic Open Hearth

—Construction data and refractory technique above the sill plate level.

By J. H. CHESTERS
Central Research Department, United Steel Companies Ltd., Stocksbridge, Near Sheffield, England

IT is doubtful whether any furnace calls for as great a variety of refractory materials as the basic open-hearth furnace. Furthermore, the refractories required vary, not only with the type of open-hearth furnace, i.e., whether "cold pig fixed," "hot metal fixed," or "hot metal tilter," but also according to the rate of drive and the type of steel being made. The present discussion is concentrated on the smaller (80 ton) type of fixed furnace charged with cold pig iron and scrap and fired with producer gas, but periodical reference will be made to hot metal furnaces, in particular to the 300-ton Talbot tilting furnaces fired with mixed gas.

Figs. 1 and 2 show a photograph and a pictorial section through a cold pig fixed furnace of the 80-ton class. It consists essentially of the above stage section, sometimes referred to as the "laboratory" of the furnace, since it is here that the steel undergoes its chemical changes; and the below stage section which although less interesting from the point of view of refractories, is nevertheless the distinguishinug feature of the Siemens or open-hearth furnace. This latter section consists essentially of four chambers filled with firebricks which serve to remove heat from the exhaust gases on their way to the stack and to return as much as possible of this heat to the incoming gas and air.

Above the stage level, the furnace can be divided into the roof (both the main section and the ends or ramps); the side walls (back, front and end); the ports (or burners); and the hearth. The latter is the only part that should come in contact with the molten steel, but the whole of the inside of the furnace is bathed with an atmosphere rich in iron oxide and lime and hence must be constructed of materials capable of resisting basic dust at temperatures as high as 1700 deg. C. (3092 deg. F.).

The below stage section can be divided into checker chambers and their fillings; the slag pockets, which act as dust catchers and thus reduce the rate at which the checkers choke up with dust; the downtakes from the ports; and the flues which connect the checker chambers with the stack and the producer via the furnace valves.

The refractories required for the tilting furnace, the laboratory of which rotates so as to facilitate the tapping of the metal and slag without emptying the furnace, are essentially similar to those used in fixed furnaces but the back wall cannot be built of silica bricks since when the furnace tilts, it becomes covered with a basic slag rich in CaO, FeO or MnO. Furthermore, since the hearth is rarely seen, being almost always covered with metal, every precaution must be taken to insure that it is as sound as possible at the start of a campaign.

Nomenclature of Furnace Parts

The Open Hearth Refractories Joint Panel in Great Britain recently adopted a standard nomenclature for open-hearth furnaces. The agreed procedure which has been published in the Iron and Steel Institute Special Report No. 26, 1939, is reproduced in Fig. 3. It will be seen that this does not differ at all seriously from the nomenclature generally used in America, though certain terms, e.g., bulkhead (equivalent to a "wicket" or "end"), are not employed. Indeed the similarity between British and American usage is so great that it is thought that the British nomenclature can be employed without any misunderstanding. In the present article the refractories used in Sections 1 to 16 (excluding 7, 8 and 9) will be described together with the conditions they must withstand and the normal causes of failure. An attempt will also be made to indicate possible lines of future development.

FIG. 1—An 80-ton cold pig fixed basic open-hearth furnace tapping into the ladle.

One axiom must always be kept in mind, namely, that, although for convenience the furnace is sub-divided into as many as 40 parts, it must in practice be considered as a unit and should ideally run for a long period and then all collapse at once. It is true that certain repairs can be made to a furnace without loss of production, particularly during the short week-end shut down; but a roof, for example, that lasts only a few weeks longer than the back and front walls, does not offer any great advantage since it does not pay to put a furnace back into commission with a roof only capable of a few weeks additional life. One the other hand, a roof that will last twice as long as the back and front walls is more than twice as valuable, since the labor of the second installation is saved.

The Roof

(Sections 5 and 6)

(A) CONSTRUCTION:

Shape: The roof may be flat or be cambered in one or two directions. It may have a pronounced knuckle between the main roof and the ramps as in a Venturi furnace, or be continuous as in the Maerz furnace. Generally speaking, the simpler the design the less the strain on the refractories since sudden changes in contour usually lead to localized wear.

Ribs: The relative merits of

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FIG. 2—Section drawing of an 80-ton cold pig iron fixed open-hearth furnace, showing the path of the gases.

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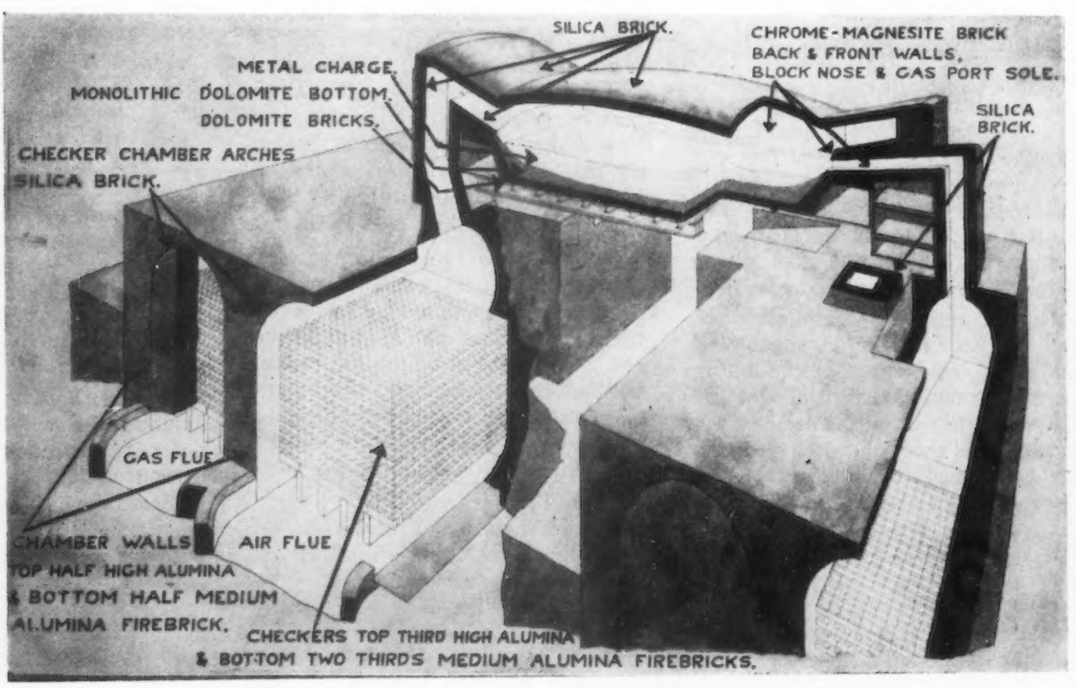

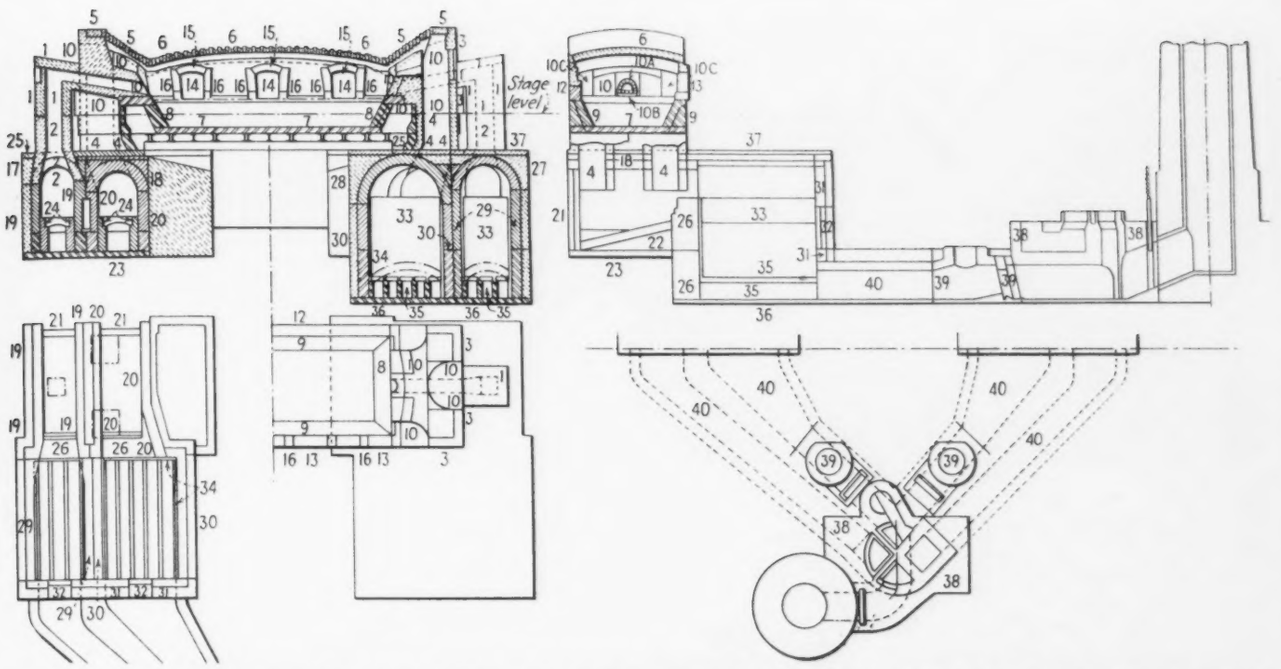

1 Gas Ends. 2 Gas Uptakes. 3 Air Ends. 4 Air Uptakes. 5 Ramp Roofs. 6 Main Roof. 7 Bath Bottom. 8 Bridge Bank. 9 Banks. 10 Blocks, comprising: 10A Gas Port Arch, 10B Gas Slopes, 10C Wing Walls, 10D Air Port Arches (if present). 12 Back Wall. 13 Front Wall. 14 Doors. 15 Door Arches. 16 Door Jambs. 17 Gas Slag Arches. 18 Air Slag Arches. 19 Gas Slag Walls. 20 Air Slag Walls. 21 Slag Wickets. 22 Slag Slopes. 23 Slag Bottom Paving. 24 Slag False Walls. 25 Slag Top Paving and Protection Walls. 26 Checker Bridge Walls. 27 Gas Checker Arches. 28 Air Checker Arches. 29 Gas Checker Side Walls. 30 Air Checker Side Walls. 31 Checker Front Walls. 32 Checker Wickets. 33 Checker Bricks. 34 Checker False Walls. 35 Checker Bearers and Bearer Walls. 36 Checker Floors. 37 Checker Top Paving. 38 Gas Valve. 39 Air Valve. 40 Flues. 41 Intermediate Blocks.

Fig. 3—This diagram illustrates the nomenclature of the various sections of an open-hearth furnace.

ribbed and plain roofs have been recently discussed by McDowell. The main object of the ribbed roof is to provide additional strength without a corresponding increase in roof weight. Examples have been seen, however, where the use of ribs has clearly introduced complications. Thus, the position of the ribs in the roof can sometimes be seen from the inside of the furnace due to local spalling or melting either along or between the ribs. In the United States, the 12-in. roof with 15 or 16-in. ribs, the 13½ and 15-in. roof with 18-in. ribs, and the 18-in. roof with 22½-in. ribs, would appear to be normal practice. In Great Britain roofs tend to be thinner, the 12-in. roof with 14-in. ribs being more general.

Bonding: Many open hearth men prefer the bonded roof without ribs since this obviates one very serious risk with the ordinary "straight ring" roof, namely, the falling in of an entire ring due to its having become thin at one point. The bonded roof takes more time to install and requires more care in construction, but experience points to its being a more satisfactory job in particular more likely to maintain its shape.

Suspension: The suspension of a roof by steel hangers has certain obvious advantages, notably the avoidance of the great stresses produced on the inside of the brick during the heating up period. It presents, however, certain serious difficulties, in particular that of protecting the hangers against oxidation as the roof grows thin. It can also be questioned whether the removal of the pressure between the bricks during the heating up period is actually an advantage, since if thermal spalling occurs the side pressure may keep the fragments in position until such time as the roof glazes over. It is true that the arch can be repaired at any point without the fear that the remainder of the roof will fall in but equally difficult repairs are achieved

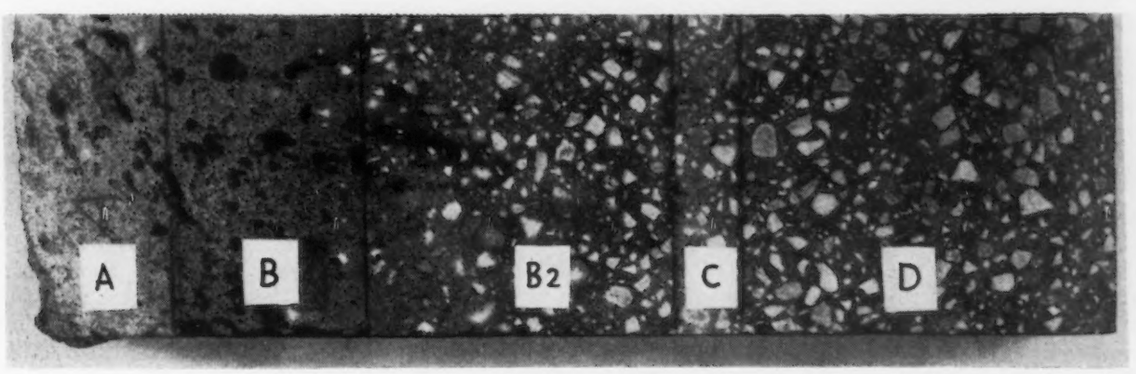

FIG. 4—Zoned structure of a silica roof brick after use in an open-hearth furnace. Zone A, cristobalite; zones B and B2, mainly tridymite; zones C and D, similar to the unused brick.

with spring roofs by replacing the centers anl cutting out the damaged portions; and for silica bricks, at least, there would not appear to be any great advantage in suspension. The sprung arches have a one-piece skew-back of which a number of types have been designed to avoid vertical slip and/or burning of the skew-back channel. The importance of keeping the latter in good condition and true alignment cannot be over-emphasized. One of the difficulties experienced in making good sprung arches has been the poor shape of silica roof bricks. Thus, at one time, bricks ordered with a slight taper were liable to vary from brick to brick by more than the amount of the taper. With modern bricks, however, made in loose lined steel plated molds, the shape is excellent and the roofs can be built entirely from end-arch bricks. With sprung arches a number of wedge bricks are usually left above the general level, and these are driven home until the roof lifts from the centers before the latter are removed.

Thickness: Most open hearth roofs in Great Britain are 12 in. thick, whereas in the United States much thicker roofs are usual. Thus, according to Buell, for furnaces of more than 125 tons capacity the tendency is towards an 18-in. roof with 22½-in. ribs.

Rise: In Great Britain an initial roof rise of 1¼ in. or 1½ in. per ft. of chord is usual but, according to Buell, much greater rises are common in the States. The use of a lower rise, say 1 in. per ft., is liable to lead to flattening of one section and eventual collapse of the roof due to its "breaking its back." It should, however, be noted that even with relatively hard fired silica bricks and a normal rise, a roof having a span of only 14 ft. may rise during the heating up period by as much as 7 in.

According to Buell the horizontal thrust on the skew-back of an open-hearth furnace roof is given by the equation:

$$HF = \frac{\frac{1}{2} W \times C \times K}{8 \times R}$$

where HF = horizontal thrust in pounds.
W = weight of the roof in pounds.
C = length of the chord in feet.
R = rise of the roof in feet.
K = coefficient (2.0).

The coefficient K is an empirical safety factor included to take account of thermal stresses developed within the roof while under heat.

The formula is interesting in that it shows that if a roof is too flat, i.e., R is too small, the horizontal thrust will be very great and possibly too much for the skew-back system too withstand.

Expansion allowances: In general the allowance for expansion in roofs made from hard fired silica bricks is approximately equal to the thermal expansion to 1000 deg. C. (1832 deg. F.), i.e., about 1.25 per cent. This allowance is made either in a series of wide gaps parallel to the roof rings or in a bonded roof by means of spacers, e.g., ⅛-in. felts placed between every other brick in planes perpendicular to the length of the roof and 12 in. apart. No expansion allowances are made from back to front. Since it is by no means certain that the expansion of individual bricks is transmitted through considerable lengths of roof or side walls, the distribution of the expansion allowance into a large number of small gaps is very desirable. The use of felt has proved advantageous not only because it burns out at a comparatively low temperature, yielding a small amount of ash, but because it provides a cushioning action even at the outside of the roof and during the early stages of heating up.

Cement: Certain furnace builders still employ cement for setting roof blocks. It is very doubtful whether any advantage is gained from this practice, particularly if the bricks are of good shape. If, however, cement is used, it is essential that it should be of a refractoriness almost equal to that of the bricks themselves.

Insulation: A great deal has been written as to the merits and dangers of open-hearth roof insulation. Sufficient work has been done, mostly in the States, to show that insulation can be economical both of fuel and refractories, but there is little doubt also that if overheating of a roof occurs it is more dangerous with an insulated roof where the temperature gradient is less steep, than with an uninsulated one. For this reason, the use of insulation should go hand in hand with roof pyrometry. Where roofs are insulated the most common method is the use of an expanded Vermiculite (expanded mica), which not only has a very low conductivity but is sufficiently resistant to heat to be capable of recovery for use in a second campaign. One principle that must not be ignored in connection with insulation is that if it is applied it should be applied evenly over the whole of the roof surface, since otherwise local overheating and consequent melting is bound to occur.

(B) MATERIALS:

Specifications: There would not appear to be any British or American specifications for roof bricks for open-hearth furnaces, but there is a German specification (D.I.N. 1088) which can be summarized as follows:

Chemical analysis: SiO_2 >94.5 per cent, Al_2O_3 <2.0, CaO <3.5.

Pyrometric cone equivalent: At least Seger cone 32. (3110 deg. F.)

Refractoriness under load: Beginning of failure (2 kg. per sq. cm.) (2966 deg. F.).

Total porosity: <25 per cent.

Specific gravity: <2.43.

Cold crushing strength: >100 kg. per sq. cm.

It is extremely difficult to make a watertight specification for a silica roof brick, but the following clauses have been found useful: Specific gravity, "no brick to be over 2.38 and the average of the consignment to be less than 2.36"; and chemical analysis, "silica >94.5, alumina <2.00 and lime <2.50 per cent." Periodical tests are also made of melting point and of bulk density, and for these a minimum of 3110 deg. F. and 1.7 g. per c.c. are considered desirable.

Grading: Until recently the best roof bricks were considered to be of a coarse grade containing particles as large as ¼ in. in size. There is little doubt that the use of such coarsely graded (and usually soft fired) bricks facilitated the heating up of a new furnace, but recent results suggested that at least as good a life is obtained using a finer ground batch of the coke oven brick type. Such bricks are generally of better shape, glaze more readily and wear more evenly.

Shape: It is essential that roof bricks should be of excellent shape. If they are warped, and bricks are placed in the roof with their concave surfaces together, they may rupture on heating up and fall into the bath. Accuracy of size is not so essential except where a bonded

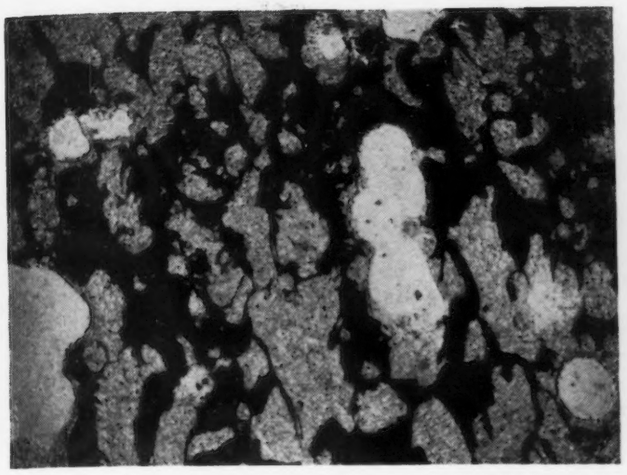

FIG. 5—Cristobalite network in zone A of a roof brick after 15 weeks service in a basic open-hearth furnace. Ordinary light, at 40 diameters.

FIG. 6—Tridymite in zone B of a roof brick after 30 weeks service in a basic open-hearth furnace. Ordinary light, 40 diameters.

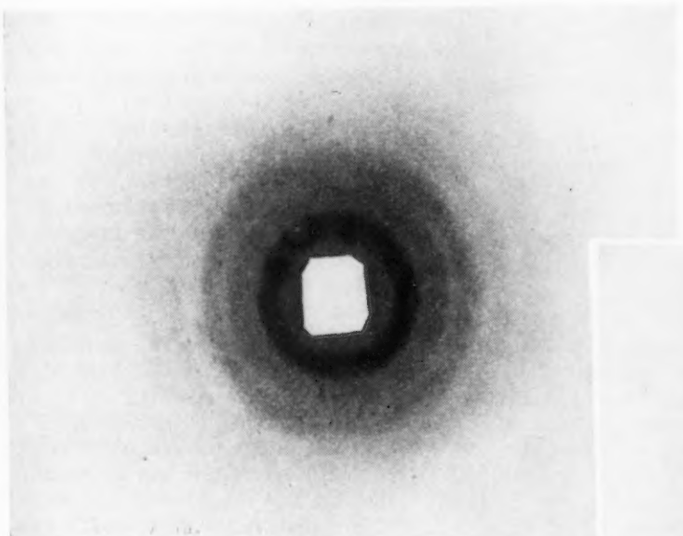

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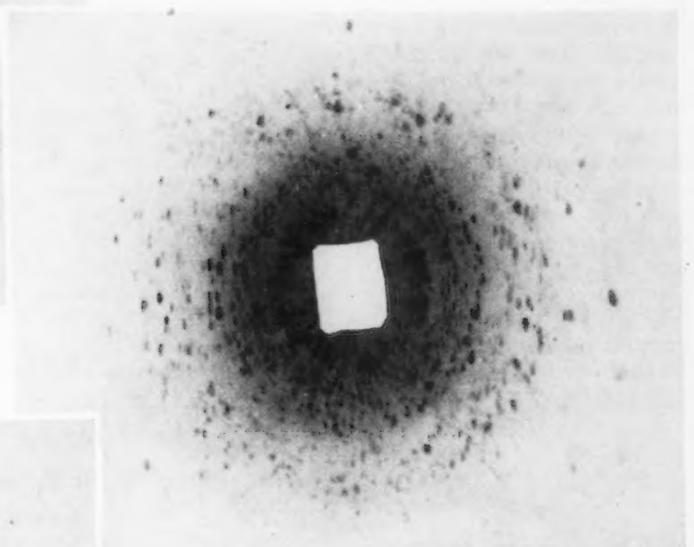
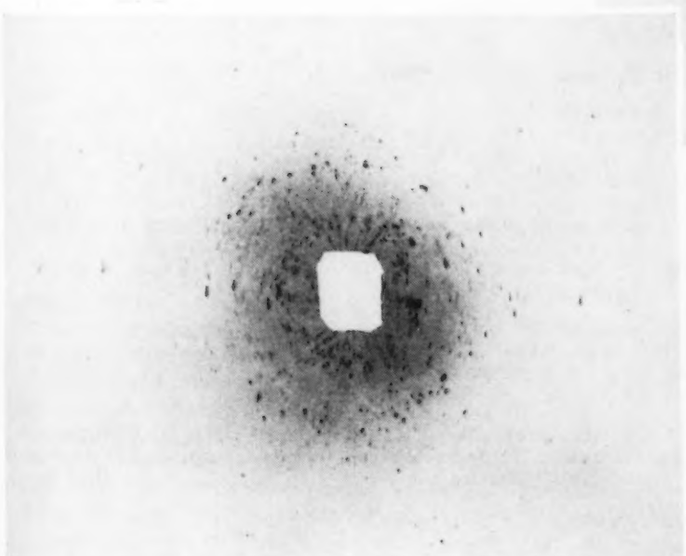
FIG. 7—Monochromatic X-ray pinhole photograph of unused silica roof brick.





ABOVE

FIG. 8—Monochromatic X-ray pinhole photograph of zone A, showing coarse crystallinity of cristobalite.

o o o

LEFT

FIG. 9—Monochromatic X-ray pinhole photograph of zone B, showing coarse crystallinity of tridymite crystals.

roof is being built. Roofs are sometimes built mainly of squares with occasional bricks of big taper, but more recently have been made throughout with 12 x 6 x 3/2⅞ in. bricks.

Analysis: Chemical analysis has already been referred to under "specifications," but it should be pointed out that the maximum lime content of 2.5 per cent is unusually high and that recently improved results have been obtained with bricks made without any lime bond at all. This has only been possible by the use of dense gradings and heavy molding pressures, but there is little doubt that the additional refractoriness obtained in this way will prove advantageous.

Melting point: Most silica bricks are found to melt in the temperature range 3110 to 3146 deg. F. as determined by Seger cones. Some of the poorer brands melt at temperatures as low as 3074 deg. F., while exceptional cases have been found where no collapse had occurred until Seger cone 34 (3182 deg. F.) was reached. Data obtained on a series of roof bricks are summarized in Table I. The methods used in obtaining such data were discussed in a previous article in THE IRON AGE.

Specific gravity: The use of the specific gravity test in the control of silica brick quality has already been discussed in previous section of this series of articles together with examples covering a nine-month period. Considerable experience in this field suggests that the greatest danger to the open-hearth furnace is not the use of a soft fired silica brick so much as the use of a batch of bricks covering a wide range of specific gravities. It is clear that if a few hundred soft fired bricks (say of specific gravity 2.45) are built into a roof whose average specific gravity is only 2.35, then local expansion leading to a "pimple" on the roof and subsequent spalling, is liable to occur. Both microscopic and X-ray examinations are useful as a check on specific gravity and in general a good correlation is obtained between the residual quartz content and the values determined by the specific gravity test. As a further check, after-expansion tests on 3 x 2 x 2-in. prisms cut from the test bricks and fired for 2 hr. at 1500 deg. C. (2732 deg. F.) are useful. Thus, for example, it will be seen in Table I that the soft fired brick S.9, specific gravity 2.39, also shows the highest after-expansion.

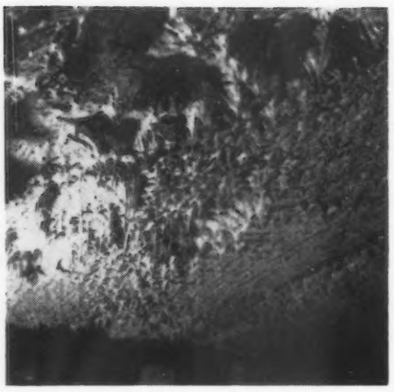


FIG. 10—Basic open-hearth furnace, showing "silicicles" due to local overheating.

Bulk density: There is little doubt that the use of a silica brick of high bulk density tends to increase roof life. Thus, most of the existing records have been obtained with bricks whose bulk density was of the order of 1.90 g. per c.c. It will be seen from Table I, however, that very few roof bricks have a bulk density even approaching this value. With the unfired brick a high bulk density is relatively easy to obtain by good grading of the quartzite, but on firing the porosity tends to increase and the bulk density to fall. The production of bricks having a bulk density of 1.85 g. per c.c. should, however, be possible with most of the quartzites used for silica brick making, and if this standard could be maintained, there is little doubt that an improvement in roof life would result.

Refractoriness under load: Most bricks withstand a load of 25 lb. per sq. in. for 1 hr. at 1600 deg. C. (2912 deg. F.) without collapsing more than about 1 per cent. In view of this and the fact that in practice a large part of the load is carried by the cooler part of the roof, there is little likelihood of roof failure due to sotening of the bricks.

Cement for use with silica roofs should, as already stated, be of high refractoriness, a melting point of at least 1690 deg. C. (3074 deg. F.) being considered desirable. It must be plastic so that it can be readily troweled and must retain its water for a sufficient period to enable the bricks to be set before the cement becomes dry and brittle. In general, such cements contain rela-

TABLE I

Properties of Open-Hearth Furnace Roof Bricks (Silica)

	BRITISH				AMERICAN		GERMAN	
Code No.	S. 8	S. 6.	S. 5.	S. 7	S. 9.	S. 2.	S. 3.	S. 4.
Apparent Porosity, per cent	25.4	22.7	22.8	23.6	26.5	25.8	23.5	20.7
Bulk density, g. per c.c.	1.73	1.79	1.83	1.76	1.75	1.72	1.78	1.85
lb. per cu. ft.	108	110	114	110	109	107	111	116
True Specific Gravity (Rees-Hugill Flask)	2.30$_6$	2.33	2.36$_6$	2.32	2.39	2.30	2.32	2.32$_6$
Permeability to air (perpendicular to working face and through no skin)	0.079	0.049	0.041	0.083	0.105	0.189	0.138	0.017
After Expansion (2 hr., 1500 deg. C.), per cent	0.0	1.1	0.5	0.5	1.7	0.2	0.4	0.4
Refractories under load, maintained at 1600 deg. C. for 1 hr. 25 lb. per sq. in.	0.6 per cent collapse	0.7 per cent collapse	sheared in 24 min.	0.0 per cent collapse	sheared after 7 min.	sheared after 30 min.	1.4 per cent collapse	0.4 per cent collapse
Thermal shock resistance (450 deg. test)	2	2	18	2	3	3	1	8
Pyrometric cone equivalent (Seger)	cone 32, 1710 deg.	32, 1710 deg.	32, 1710 deg.	32 to 33, 1710 to 1730 deg.	31, 1690 deg.	32, 1710 deg.	32, 1710 deg.	32 to 33, 1710 to 1730 deg.
Microscopic examination								
Approximate per cent quartz	0	30	30	20	30	0	5	20
" " " tridymite	50	20	35	40	10	50	20	30
" " " cristobalite	50	50	35	40	60	50	75	50

tively little material of over 25 mesh (B.S.I.) size. Originally such cements were made from finely ground ganister with a small amount of either lime or clay bond, but more recently quite satisfactory results have been obtained by grinding used silica bricks, which are both cheap and easy to grind and still yield a cement of high refractoriness.

The properties of chrome magnesite bricks for use in open-hearth furnace roofs have already been discussed in an earlier article in THE IRON AGE (1940, Vol. 146, No. 7, p. 35, No. 8, p. 39), and will not therefore be referred to herein.

(C) LIFE AND CAUSES OF FAILURE:

The life of an open-hearth furnace roof varies from about eight weeks to a year, according to the rate of drive, the material melted, the furnace design, and various other factors. For an 80-ton fixed furnace, a life of 13 to 26 weeks is considered reasonable.

The life obtained can be seriously impaired by improper treatment during the heating-up period. The actual heating schedule employed varies greatly from plant to plant but in general the total time before gassing the furnace is between 24 and 72 hr. Thus, A. E. Dodd suggests for a 70-ton furnace the following schedule which enables the furnace to be gassed in approximately 24 hr.—from 0 to 200 deg. C., rate of heating = 25 deg. C. per hr.; from 200 to 300 C., rate of heating = 12 deg. C. per hr.; above 300 deg. C., rate of heating = 40 to 50 deg. C. per hr.

The furnace is usually gassed when the roof temperature, as determined by the thermocouple protruding through a hole in the roof, is about 600 deg. C. (1112 deg. F.), and experiments carried out on temperature gradients in the roof suggest that this procedure is a safe one. In many plants, even the above schedule is not considered safe and a similar but much slower rate of heating is employed. Whatever the schedule used, it is essential that the rate of heating through the cristobalite inversion range (200 to 300 deg. C.) should be low and that after passing 300 deg. the furnace should not be allowed to fall below this temperature as it is liable to do if doors or dampers are opened too wide. In general, the heating-up is done either with coal fires on the hearth or with coke oven gas flares brought into the furnace via the doors. With care the scheduled rate of heating can be obtained by either method with considerable accuracy. The use of big wood fires, e.g., railway sleepers, is to be avoided, since the long hot flame which results is liable to cause spalling due to local overheating of the roof. Wherever possible, the roof thermocouple should be connected to a recording instrument so that the heating-up schedule is available for subsequent reference, should any spalling of the roof occur. When such a recorder is available it is desirable that the scheduled rate of heating be marked on the graph at the beginning of the heating up period, so that the melter has a definite ideal to follow.

Even when the roof has been brought up to temperature without spalling, it still requires to be "matured" or "seasoned." It has long been common knowledge with open-hearth furnace melters that a roof that has been maintained close to its melting point but not above it during the early stages of the campaign has a better chance of a long life. There are certain obvious reasons for this, for example, a roof that has glazed over is less likely to collapse during a shut down period, but the real reason for the improvement is shown by an examination of used roof bricks.

A great deal has been published (c.f. the bibliography) on the zoning of roof bricks in open-hearth furnaces, but one point still requires emphasis, namely, that the working face of the brick is generally *more refractory* after months of service than it was at the beginning of the campaign. This is not apparent if the test cones are made from crushed brick, since the cristobalite network that has formed in the working face is destroyed, but it is clearly demonstrated as the following data show, if the cone is *cut* from the working face. The division into zones used in the present tests, is illustrated in Fig. 4. Open-hearth roof bricks are frequently divided into as many as nine different zones according to their color, as was done for example by Harvey, but for practical purposes four or five zones are probably adequate, namely:

(a) The gray working face.

(b) The black section between A and the so-called transition zone C.

(c) The relatively narrow pale yellow zone between B and the remainder of the brick.

(d) The reddish section at the cool end of the brick.

In the present work, zone B was subdivided into sections B and B2, as it had been found in earlier work that zone C was essentially similar in properties (see below) to unused brick, while there was a marked difference in properties between the inner and outer halves of zone B.

Both the above brick and the brick of zone analyses shown on page 46 were obtained from a 300-ton tilting furnace, but extensive studies made on bricks from fixed

	Zone A	Zone B	Zone B2	Zone C	Zone D
Length of the zone (cm.)	3.0	4.0	6.5	1.5	8.0
Apparent porosity, per cent	17.9	16.3	7.5	23.5	23.7
Bulk density, g. per c.c.	2.09	2.04	2.10	1.81	1.81
Specific gravity, apparent	2.55	2.44	2.28	2.37	2.37
Permeability to air, perpendicular to zone interface and through the whole of the zone	0.431*	0.131	0.004	0.056	0.046
Pyrometric cone equivalent.					
(a) Cut cone, deg. C.	1730	1710	1700	1690	1700
(b) Crushed cone, deg. C.	1700	1690	1690	1680	1690
Microscopic examination.	cristobalite magnetite glass.	tridymite magnetite glass.	tridymite quartz glass. Unidentified mineral of high birefringence.	Similar to D.	Essentially similar to unused brick (25 per cent raw quartz).

*As low as 0.0002 in some samples.

furnaces reveal similar characteristics.

	Zone A	Zone B	Zone B2*	Zone D
SiO_2	84.35	84.50	88.75	94.80
Al_2O_3	1.31	1.79	1.80	0.91
Fe_2O_3	6.56	6.24	3.36	0.95
TiO_2	0.18	0.17	0.24	0.13
MnO	1.07	0.93	0.28	0.09
CaO	5.55	5.17	4.95	1.80
MgO	0.83	0.80	0.42	0.36

* Zone C was not analyzed in this case but is generally found to be similar in composition to that of Zone D and the unused brick.

The above changes during service may be summarized as follows:

(1) That part of the working face of the brick above 1470 deg. C. (2678 deg. F.) changes to a network of cristobalite crystals. Although considerably richer in fluxes than the original brick, this matured face is more refractory, denser and (apart from occasional large holes) more impervious than the original brick. Furthermore, it is in general glazed and will presumably reflect the radiated heat from the flame more than the new brick.

(2) There is a big difference in thermal expansion characteristics between zones A and B and zones B2 and C, and hence it is not surprising that if an old roof is heated up too quickly it spalls along one or other of these interfaces.

(3) More detailed studies show that there is a concentration of fluxes at the interface between B2 and C which explains why spalling that exposes this face is frequently followed by localized melting in spite of the fact that the roof must be somewhat cooler at this point due to the smaller roof thickness.

(4) The crystal size of the cristobalite in zone A and the tridymite in zone B as shown by microscopic and X-ray examination (Figs. 5, 6, 7, 8 and 9) is very high compared with that in the original brick.

For more detailed information on zoning, the reader is referred to the excellent descriptions given by Larsen and Schroeder, Harvey and the other workers referred to in the bibliography.

Research carried out in the United States, and to a less extent elsewhere, seeks to aid roof life and possibly increase furnace production by the application of roof pyrometry. The difference in temperature between the melting point of steel and brick is so small that it is essential that the maximum use be made of it in order to give the highest possible production without damage to the roof. This object can be achieved if the temperature of the roof is accurately known and the furnace is maintained as close to this temperature as possible, but never above it. Several types of pyrometer have been developed for this purpose, the principal ones being the hollow silicon carbide roof block with an external Féry radiation pyrometer above it, or the total radiation or photo cell pyrometers focused through a hole in the side wall on the central section of the roof. The maximum temperature employed varies somewhat from works to works but is generally in the range 1650 to 1680 deg. C. The installation of a roof pyrometer does not absolve the operator of responsibility for his roof since it is possible that the latter may be melting at a point in the furnace at a higher temperature than that on which the pyrometer is focused, but it does provide him with a tool that makes his job easier in that he is at least aware of the general temperature trend. The installation of such pyrometers will doubtless do much to obviate the excessive running of roofs illustrated in Fig. 10.

Given proper treatment, the wear on a roof is very slight. It is due to a combination of erosion and corrosion by iron oxide and lime. Spalling should be considered as a pathological condition and rarely occurs if a proper rate of heating is employed both with a new roof and on reheating an old roof after cooling down. Spalling rarely occurs during the cooling period since by the time the critical temperature of 300 deg. C. has been reached, the rate of cooling is very low. The rate of wear of a roof has been found to increase greatly if the atmosphere is strongly reducing such as may occur when a high percentage of coke oven gas is employed or when water vapor, e.g. from a leaky port, comes into contact with the roof. The exact mechanism of the reaction is still far from clear, but Dodd has shown by laboratory experiments that silica bricks heated in water vapor may have a refractoriness as much as 100 deg. less than their refractoriness in air.

Where a roof or side wall has to be patched with silica bricks while the furnace is still in operation, the amount of spalling which occurs can be greatly reduced by boiling the bricks in tar or dipping them in creosote prior to use. The advantage gained can scarcely be due to the bonding effect of the tar-coke since no such coke would be formed with the creosote. It is probably the result of the reduced rate of heating through the cristobalite range due to the heat required to evaporate the impregnating liquid.

(D)—LINES OF IMPROVEMENT:

Possible ways of increasing roof life may be summarized as follows:

(1) The use of silica bricks of higher bulk density.

(2) The use of bricks made without added bond.

(3) A study of the factors controlling glazing with a view of obtaining a roof that matures more readily.

(4) The use of basic refractories, e.g. chrome magnesite bricks in positions where the wear is excessive, such as over the taphole, and possibly for the whole of the roof.

(5) The extended use of roof pyrometry which not only provides a means of control, but also makes the furnace operator "roof conscious."

Ed. Note:—Next week the author concludes this informative survey of the basic open hearth with detailed data on the back and the front walls, gas and air ends, and parts.

Merits of Continuous Normalizing

TO examine the merits of normalizing the steel strip in a continuous furnace, A. Pomp and G. Niebch have carried out a series of tests, recently described in Archiv für das Eisenhüttenwesen.

The two investigators used a large furnace 69 ft. long overall, with a 14.8-ft. furnace chamber which was electrically heated and divided into three zones of graded heat. The strip was passed through the furnace, which contained an atmosphere produced by the combustion in excess air of grid gas, at varying speeds to determine the optimum rate of transit for best results. Strip of 1.6 x 0.039-in. section, which had been cold rolled to varying degrees of reduction, 10, 20, 40 and 60 per cent, was heated to a different temperature in the range from 1202 to 1652 deg. F., and the mechanical properties of the normalized product compared with similar material which had been normalized in the ordinary way in batch-type furnaces.

Heating for less than 3 min. in the roller-hearth furnace proved to be sufficient for normalizing, and the product had practically the same mechanical properties as the batch-furnace product. Two specimens of strip were treated in this way, a careful control being kept on the temperature by means of a thermocouple consisting of the strip itself and a welded-on constantan wire, which was also passed through the furnace to give the actual strip temperature as well as the positive heat gradient and the maximum temperature reached. The final temperatures in separate tests were 1202, 1292, 1472, 1652, and over 1652 deg. F., with speeds of transit varying from 2.1 to 7.3 ft. per min.

The same behavior was not shown by the two specimens examined, the effects of normalizing on the mechanical properties becoming increasingly divergent as higher temperatures were reached. Up to final temperatures of 1112 to 1202 deg. F., there was no marked difference in the two sets of mechanical properties; at 1292 deg. F., there was little difference between strip I and the batch-heated sample, the ultimate strength, deep drawing properties and yield point being, however, slightly better. On the other hand, at this temperature strip II was not as good as the corresponding batch-furnace product, the elongation and cupping values being alone comparable. This difference was more pronounced at 1472 deg. F. On the whole, the degree of normalizing, *i.e.*, the removal of the stresses due to cold working, becomes more complete as the temperature is increased, yet the rate of change with temperature in the magnitude of the mechanical properties was not the same for the two steels.

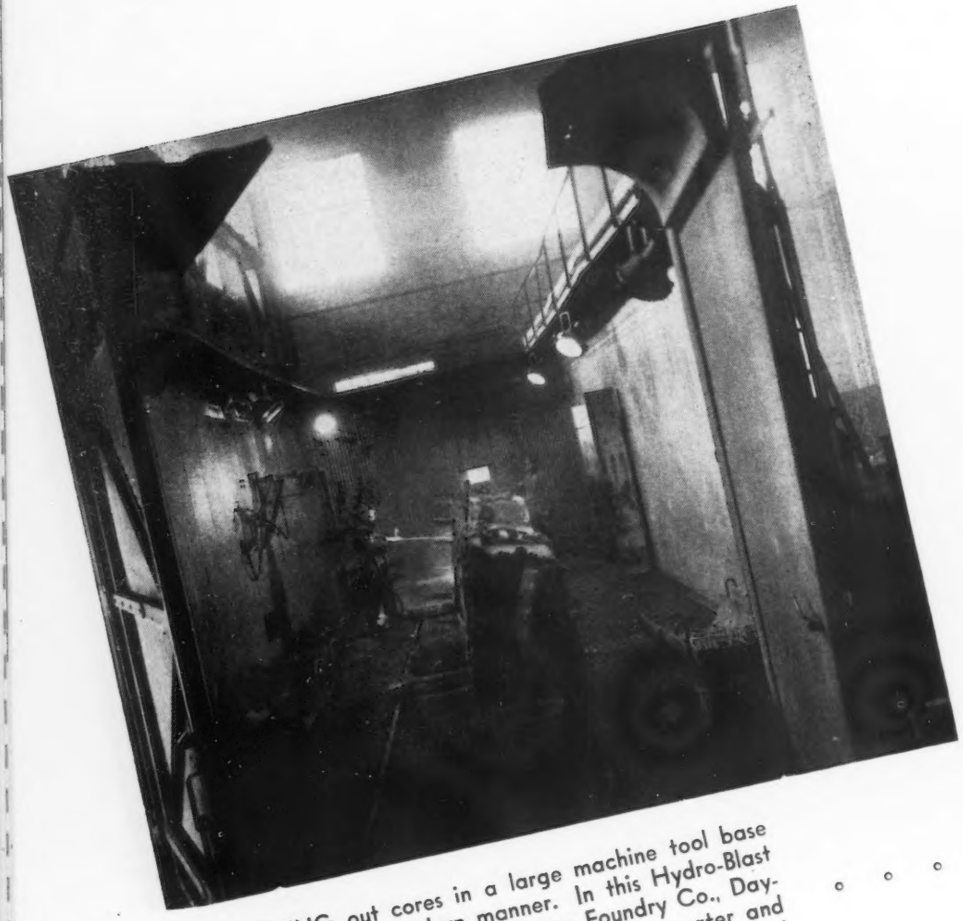
The authors point out that while this method gives rapid and satisfactory normalizing, it is apparent that the success of the process depends not so much on the suitability of the particular furnace used, but on the characteristics of the materials itself, as witnessed by the very different behaviors of the two strips investigated. An essential condition is that the strip must be capable of recrystallizing during its short passage through the furnace and of being relieved of its internal stresses; if this is achievable the condition of the product from the roller-hearth furnace is equal to that furnished by the batch-type furnace.

Life of Magnesite Open Hearth Bottoms

THE percentage of magnesia in the magnesite is a measure of the quality of a fused-on magnesite bottom in open hearth, and experience at the Magnitogorsk Works, U.S.S.R., has shown the 75 per cent of magnesia is the optimum proportion, according to V. Dement'ev, writing in Stal, No. 12, 1939, and translated by the Iron and Steel Institute (British).

Further analyses showed that the main change in the composition of the furnace bottom during the period of its service was a reduction of the magnesia content. In this paper the author deals with the causes of the reduction of the stability of the bottoms. These are: (1) *Diffusion of admixtures into the fused-on bottom.* This in turn is conditioned by the difference in the compositions of the bottom, the metal and the slag, as well as by the temperature and porosity of the bottom. (2) *The composition of the bottom and the duration of its burning-in.* Ample time for burning-in should be allowed. (3) *Deposits adhering to the bottom.* These are caused mainly by the practice of charging lime directly on to the bottom of the furnace. The best method is to charge a layer of clean fine iron scrap, which will protect the bottom from the lime and ore, and will also damp out shocks during charging. If iron scrap is not available, a layer of ore is the next best thing. (4) *Chemical activity of the bottom.* This is partly the consequence of (1), (2) and (3). The impurities which find their way into the bottom, in particular ferrous oxide and manganous oxide, undergo repeated reduction and oxidation during the various stages of the open hearth process. Statistical investigations have shown that the oxidizing action on the bottom during the time the furnace is standing empty between heats is directly connected with the time lost in repairing bottoms. The oxidizing period during the heat has a like effect. (5) *Basicity of the slag.* The maximum stability of the bottom is obtained with a lime/silica ratio in the slag of 2.6. (6) *Carbon content of the metal.* The higher the carbon content, the lower is the melting point and the higher is the stability of the bottom.

Hydro-Blast Cleaning in



KNOCKING out cores in a large machine tool base casting in the modern manner. In this Hydro-Blast wet system installed at the Advance Foundry Co., Dayton, a relatively fine stream of high pressure water and entrained sand quickly breaks up the core body and washes loose sand and lumps out of the cavities.

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RECENT installation of Hydro-Blast wet sand cleaning apparatus in the Advance Foundry Co., Dayton, Ohio, is saving this jobbing foundry $106 a day in casting cleaning costs and soon will return what appeared at first to be a rather heavy investment for this operation. This medium sized foundry specializes in the production of medium and large castings for the machine tool industry and large stamping dies made of both "die iron" and the company's patented Strenes metal. The latter is a chrome-nickel-molybdenum alloy iron which is a close grained material that can be heat treated up to a tensile strength of 75,000 lb. per sq. in. and Rockwell C hardness 55. The foundry production averages 40 to 50 tons of castings a day. Some of the big machine tool bed castings run up to 40 ft. in length and as high as 50,000 lb. in weight.

Knocking the cores out of such castings with crowbars and brute strength was a long and costly process and represented a distinct health hazard, since it was obviously a dusty and dirty job. One of the biggest gains from the adoption of this wet cleaning method has been to make the shop clean and reduce the silicosis hazard to a minimum. Aside from the primary humanitarian angle and the fact that penalty premiums on compensation insurance are avoided, the effect has been to raise worker morale and efficiency throughout the foundry, as well as a lowered time cycle of cleaning. The dust level in the cleaning booth is actually lower than for the outside air. These advantages cannot be measured in dollars and cents but are obviously factors of importance.

A very definite cost saving is in the reclamation of 12 to 15 tons of core sand a day. Including the former cost of haulage of spent sand to a dump heap, this item amounts to a minimum saving of $42 a day. Incidentally, it is planned to run sand from the dump through the classifying system this spring to recover what had formerly been waste material. Another big recovery economy is in rods and gaggers. Formerly, it cost about $200 a month to purchase these stiffeners and cut them to size. Since the Hydro-Blast cleaning equipment was installed last November, the company has bought no new rods or gaggers. Saving in scrap iron is another factor, running around 1000 lb. a day, roughly worth $10 under present market conditions.

There is also an appreciable saving in labor, which means something more than money in these days when foundry workers of any kind are difficult to obtain. For example, by hand methods it used to take four men 10 hr. (40 man-hr.) to clean a 22,000-lb. planer bed. Now two men can do the job in 7 hr., or 14 man-hr., representing a saving of 26 man-hr. on this typical item. Taken together, all the tangible savings add up to $106 a day, even when offsetting power and water costs are taken into account. Both these expense items are running under original estimates made by the Hydro-Blast Corp. Water consumption is 90 gal. per min. when the machine is running, and this eventually is all discharged to the sewer as clear water free of fines. The entrained sand delivered at the nozzle at the rate of 225 lb. per min. is, of

in a Jobbing Foundry

TO date, 11 big industrial concerns have installed Hydro-Blast wet cleaning apparatus in their own foundries, but Advance Foundry Co. is the first independent jobbing foundry to adopt this method. The savings made and advantages accrued are related in this article together with a detailed description of the equipment itself.

course, all ultimately recovered, with the exception of the fractured grains.

Besides the matter of reduced cost of cleaning, there is also the gain of improved quality. Appearance of castings has been improved 100 per cent, and customers say that the castings require far less cleaning in their machine shop. Even sand that has been burned into the metal is scoured free by the highly erosive action of the sand entrained in the water. Tests show, for example, that 60 lb. of fine beach sand entrained in 30 gal. of water per min. at 1200 lb. will eat away an average of 26 gm. of copper bearing steel plate in an 8-min. test interval. Chipping time in the foundry has also been greatly reduced.

The recovered sand is being reused for cores and facing with highly satisfactory results. In appearance, it is black in color like molding sand. The complete removal of dead bond which lowers the sintering temperature of any foundry sand is the prime reason for the superiority of this washed sand. There is also an elimination of most of the non-magnetic iron oxides which are considered deleterious by most foundrymen. Furthermore, it is probable that continued re-use of recovered sand eliminates the weaker silica grains with pronounced cleavage planes. In fact, the Hydro-Blast sand recovery system permits definite control of grain distribution and moisture content which previously have been rather indeterminate factors in the operation of a foundry.

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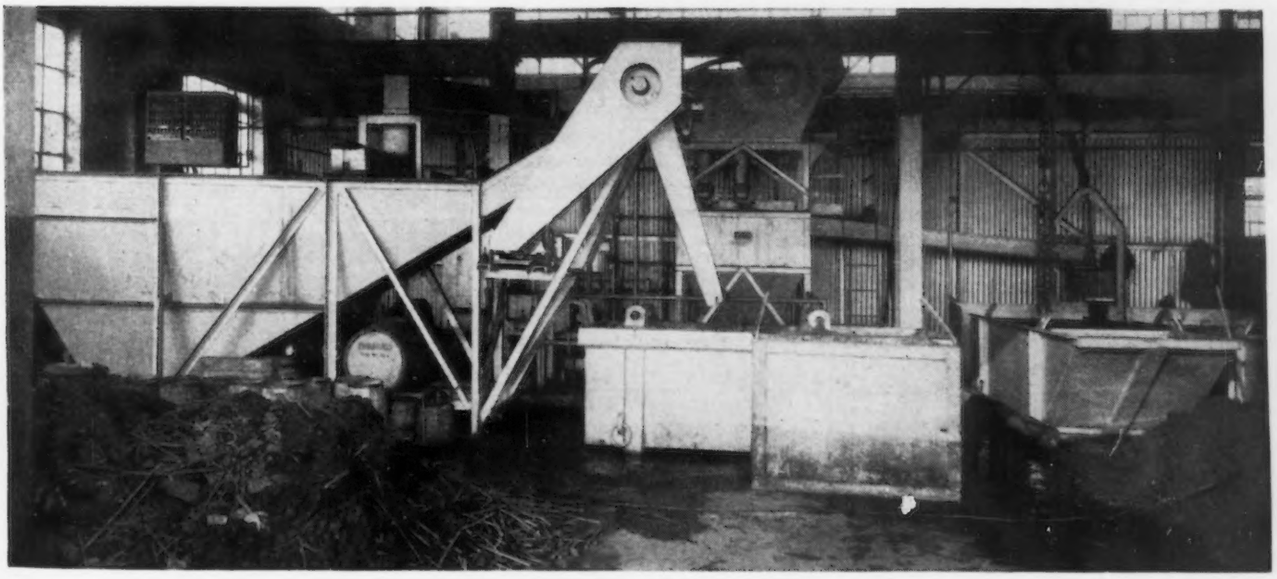
In the old days, castings were always ahead of the cleaning department and unduly clogged up the floor and occupied valuable space, which has now been partially saved. By operating the Hydro-Blast equipment three shifts a day, the cleaning department can now get out in five days what the foundry makes in six.

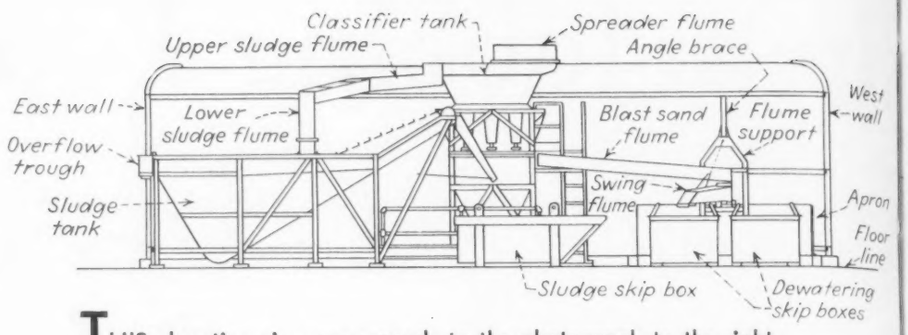
The floor plan and elevation views show the installation of Hydro-Blast wet cleaning equipment at Advance Foundry Co. This plant was especially engineered for cleaning the large machine tool bed castings made here and was the first to be built for a jobbing foundry. The cleaning room proper is 40 ft. long and 16½ ft. wide so as to accommodate the largest castings encountered. Two blast guns are in use at the present time, although only one is shown in the floor plan layout, so that two medium sized castings can be cleaned simultaneously, thus doubling the tonnage



DISCHARGE chute from flight conveyor deposits sludge into skip boxes for subsequent disposal. Sludge settling tank is at left and in front of it is pile of rods, gaggers and lump sand dropped into a skip box after passing over a vibrating screen. This large pile is the Monday morning accumulation after heavy material beached on the concrete slope under the floor grates during the week has been hosed down.

output per day. A rubberized curtain suspended from a wall jib is swung into position so as to make two rooms each 20 ft. long. This curtain is swung out of the way against the corrugated galvanized steel wall when long castings are being cleaned of cores.

Perhaps the best way to explain how the sand recovery system works will be to trace the sand from the time it leaves the blast tank. In this tank the sand is continuously flooded, and from here the excess is carried off to dewatering skip boxes for drainage. The principle of this blasting system is to use a relatively fine jet of entrained sand and water at high pressure—1200 lb. per sq. in. The high pressure pumps, each driven by a 25-hp. motor, handles only pure water from the mains and hence requires no special maintenance. Wet sand from the blast tank is drawn to the guns by the injector principle, and the only part of the guns subject to rapid wear is the nozzle itself. Its average life is 400 hr. at present, but new materials are being explored and this life may be bettered. The heavy hose connections to the guns are suspended from an overhead jib, and since the volume of liquid handled is relatively small the gun reaction force is low, eliminating the factor of operator fatigue.



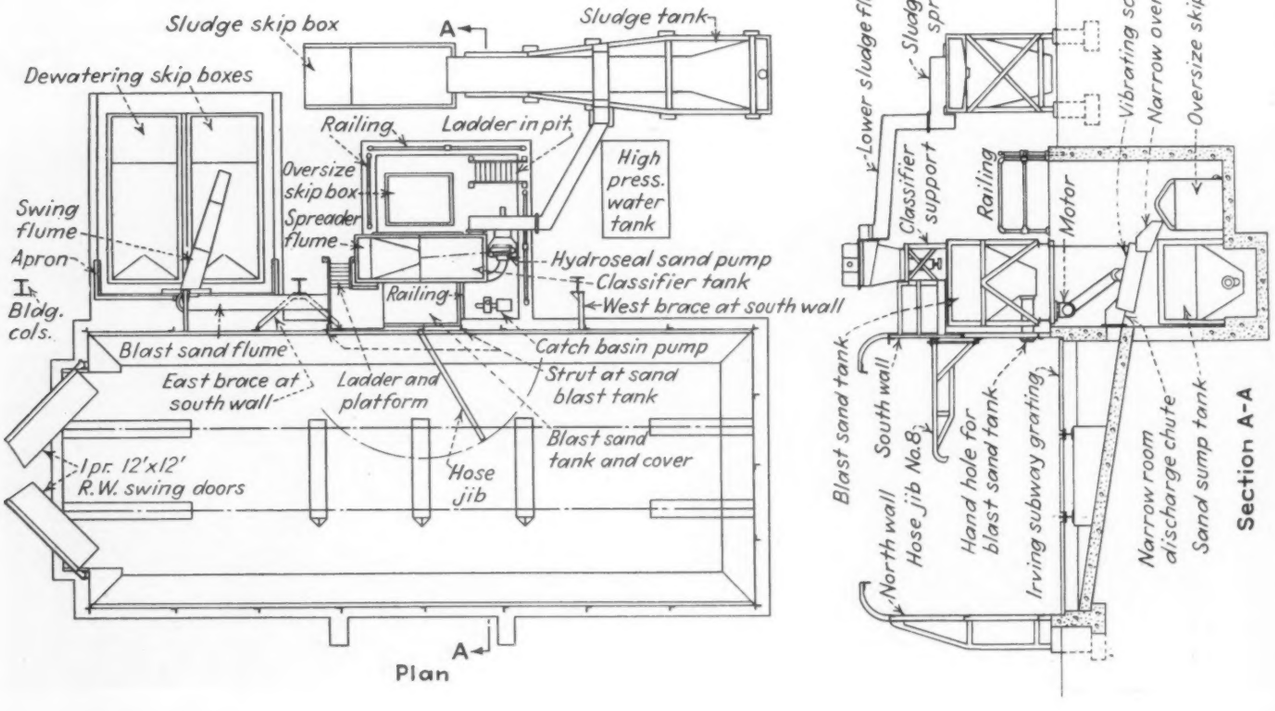
THIS elevation view corresponds to the photograph to the right.

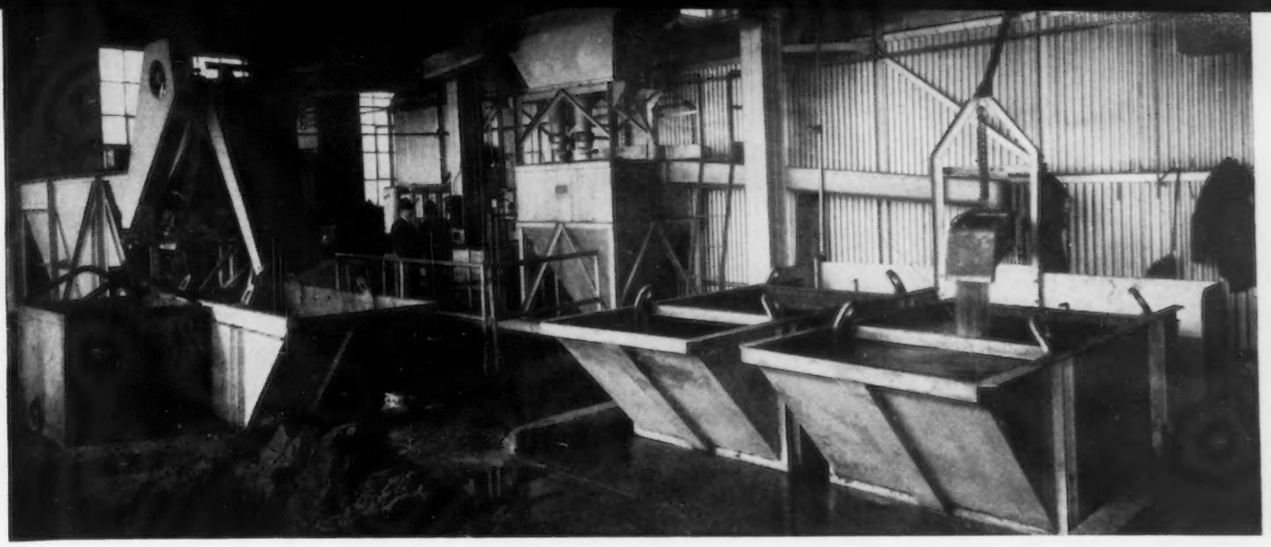
At the start the casting is generally laid on its side, exposing the bottom, top and one side to the blast jet. The casting is rolled over with the crane to expose the fourth side after most of the core material has been sluiced out. Rods and gaggers are picked up and put in baskets for the crane to handle.

Entrained scouring sand and broken cores together with some of the smaller rods are washed through the floor, which is made up of standard subway grating, and the debris is sluiced down an incline slope made of concrete to a discharge chute which delivers the material over a sloping vertical screen. Rods, gaggers, iron pieces and hard lumps are discharged into an oversize skip hoist at the right of the pit, while the sand and water passes through the screen to the sand sump tank. From here a rubber lined sand pump driven by a 10-hp. motor elevates the water and entrained sand and sludge to a classifier tank at the highest part of the apparatus.

Cleaning and classifying takes place by the flotation principle. To reach the blast sand tank below, the sand must pass through three vertical venturi tubes up which a column of water is shot at regulated pressure and velocity. By adjusting the pressure the coarse-

FLOOR plan layout and sectional view of the Hydro-Blast wet cleaning installation at the Advance Foundry Co.





DEWATERING skip boxes into which excess sand from the inundated sand blast tank is discharged. When the bulk of the water has drained through louvers in the back of boxes, the damp sand is dumped by crane on the pile in front where final air drying takes place.

ness of the grains of sand that drop through against the stream can be controlled. All other sand, clay fines and scum are carried to the top of the tank whence they overflow through a sludge flume to a spreader box and deep settling tank. Fines that settle to the bottom are removed by a flight conveyor, discharging through a chute to a large skip box. Most of the water escapes through an overflow trough at the end of the big sludge tank.

As pointed out previously, the blast sand tank is continuously flooded and excess sand and water overflows through a flume to one of two dewatering skip boxes. These boxes are constructed with louver-like partitions at the ends that effectively separate the water from the sand. Eventually, the loaded box is picked up by a crane and upended so as to discharge the contents on the heap, where the sand air dries.

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Water for the sand classifier counterjet is supplied by a 7½-hp. booster pump. The vibrating screen requires a 1-hp. motor, and an air compressor for the operator's helmet takes another 1-hp. motor. There are also two ¼-hp. motors used, one geared down for the sludge conveyor, the other to drive a chemical pump for introducing a rust inhibitor into the water line. Motors are fully enclosed, fan cooled types and can be washed down with a hose. In addition to those pumps mentioned there is also a 3-hp. catch basin pump in the sump, operated by a float valve.

The gun operators wear an air pressure helmet and rubber suit with a shatter-proof glass visor. Every 7 sec. a series of water jets wash any splashed dirt off this visor, the auxiliary water valve being controlled by an electric timer and solenoid. For worker comfort in winter and to eliminate any disagreeable cold chill feeling, the water fed the high pressure pump is preheated to 80 deg., so that the temperature at the nozzle is 60-70 deg. A gas fired horizontal fire tube boiler is used for this purpose and the temperature is thermostatically controlled.

Lighting of the cleaning room is by six 500-watt incandescent lamps in marine type, water-tight reflectors. The top edges of the room are curled over to trap spray, but otherwise the top is open so that there is no interference with work brought in by the overhead crane.

New Method of Determining Phosphorus

THE National Bureau of Standards has developed a new colorimetric method of determining the phosphorus in steel and cast iron, according to an announcement by the Department of Commerce.

This is a matter of considerable interest to metallurgists, because many determinations of phosphorus must be made, both to maintain the bath of molten metal within the proper limits and to insure that the finished products will meet specifications. Heretofore this determination has usually been made by precipitating phosphorus as the yellow ammonium phosphomolybdate and titrating the washed precipitate with a standard alkali solution.

However, the recent development of improved filter photometers has focused attention on the possibility of using rapid colorimetric or turbidimetric methods, and the one which John L. Hague and Harry A. Bright, of the Bureau's chemistry division has worked out, is of this type.

Use is made of the phosphomolybdenum blue reaction which has been employed for many years in biochemical work. The sample of steel is dissolved in diluted nitric acid and the phosphorus is converted to the ortho acid by fuming with perchloric acid. The interference of iron is avoided by reducing it to the ferrousion with sodium sulfite. The phosphateion is then converted to the "blue compound" by adding a solution containing hydrazine sulfate and ammonium molybdate and heating at 90 deg. C for about 5 min. The transmittancy of the colored solution is measured with a photoelectric colorimeter and a Corning "Lantern Shade Yellow" filter. The quantity of phosphorus is determined from a standard curve or table prepared from data obtained by treating steels containing known amounts of phosphorus in the same manner as was used for the unknown.

How to

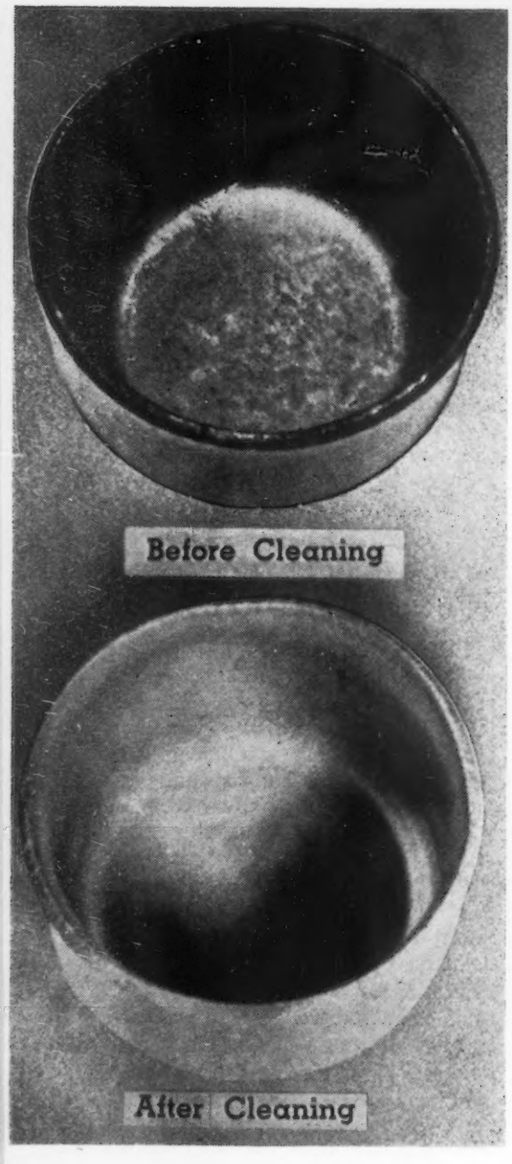
By R. W. MITCHELL
Technical Director, Magnus Chemical Co., Garwood, N. J.

RIGHT

PIECES coming from a pre-cleaning operation using the emulsifiable solvent method may have a "water break," as indicated by the strip on the left. But, the strip is otherwise thoroughly clean, and responds to final cleaning to give a chemically clean surface without "water break", as shown by the strip on the right.

BELOW

TYPICAL stamped element before and after cleaning with emulsifiable solvent. The surface is physically clean, ready for electrocleaning prior to plating.



THE National Defense Program calls for a tremendous amount of electroplating. Speed in production with minimum labor may be taken for granted as an essential factor in this work, just as it is in all work that has to do with the program. Labor is going to be scarcer and more expensive, but the equally important factor of quality also deserves emphasis.

The quality standards for plating on anti-aircraft searchlight reflectors as well as other units directly connected with war material are exceptionally rigid, of course. But it is safe to assume that *any* plating that has to be done in connection with government work will have to pass pretty stiff inspection.

The plating operation proper has always been given plenty of discussion in technical literature. Every important phase of the question, from the purity of the water used to the most effective use of high current densities has been and is being given ample attention. But, the equally important problems of cleaning prior to plating are not so frequently discussed. Cleaning of metals for plating as a technical art is less developed than plating itself. There was a time well within the memories of most platers when a plain alkali was accepted as all sufficient as a metal cleaner, regardless of the nature of the foreign matter to be removed. It was all there was available.

Improvements in technique have not alone been in the quality of the cleaning result attained. The main improvements have been in development of quicker, less laborious, more economical, safer and surer methods of cleaning. Many cleaning jobs are still difficult, even when the best available materials, methods and equipment are utilized. And some of these difficult cleaning jobs can be very expensive, very annoying and very uncertain unless the very best practice is utilized for their handling.

Quality plating must have a chemically clean surface. There is no avoiding of this essential prerequisite. But to get a chemically clean surface, it is far more practical, certainly more economical and frequently the only real way out, to work on a physically clean surface in a final cleaning operation before plating, rather than to attempt reaching perfect cleaning in

Pre-Clean Metals

—Half the Battle in Quality Plating is the Securing of a Chemically Clean Surface

one all-conclusive step. By a physically clean surface is meant one from which gross surface dirt has been removed—all such dirt as could be wiped, brushed, or scoured off, but one which has not been made clean to point of freedom from "water break," or which has not been cleaned in microscopic surface fissures or irregularities.

This article concerns itself with the cleaning operations required to get a physically clean surface, and does not discuss the use of electrocleaning, still tank cleaning, or mechanical washing machines to clean just prior to plating for the purpose of getting a chemically clean surface. It may be assumed that once proper pre-cleaning is accomplished, adequate final cleaning is comparatively much easier.

There are so many different kinds of foreign matter to be removed—even to get a physically clean surface, that this question of suitable pre-cleaning is not at all simple. The usual problem of removing buffing and polishing compounds is made complex today by the wide variety of ingredients that go into these compounds. Removal of a simple mineral grease or of abrasive particles may not be a difficult problem at all, but when many of the modern sulphurized or chlorinated oils come into the picture, cleaning often becomes very difficult. The same is true of the waxes and metallic soaps often used, not only in polishing and buffing compounds, but in modern cutting lubricants and coolants.

A busy job plating shop, receiving work from many outside sources, has a far more complicated problem in pre-cleaning than the plating department of a manufacturing plant, where the types of foreign matter to be removed remain the same from unit to unit, because the same materials are used in metal working and polishing before the work reaches the shop. The job shop, on the other hand, often finds each batch of material from different customers to constitute a special cleaning problem.

At that, however, even in plant plating departments, changes in the lubricants, coolants, polishing compounds, etc., used prior to the cleaning operation, often give rise to problems which defy solution until the men in the plating department are informed of the change or changes and make suitable adjustments in their cleaning methods.

This problem is met very frequently. Only the other day an old user of a standard cleaner reported that it was no longer giving satisfactory results. There was no reason why it should suddenly fall down on the job. Yet the men in the plating department were at a loss to explain the failure of a cleaner they had used with perfect satisfaction for over ten years. That is, until an engineer made the obvious inquiries as to lubrication

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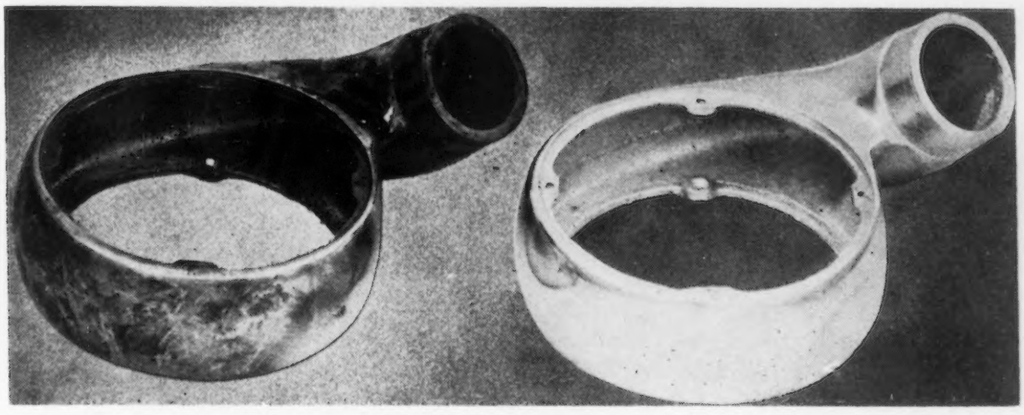
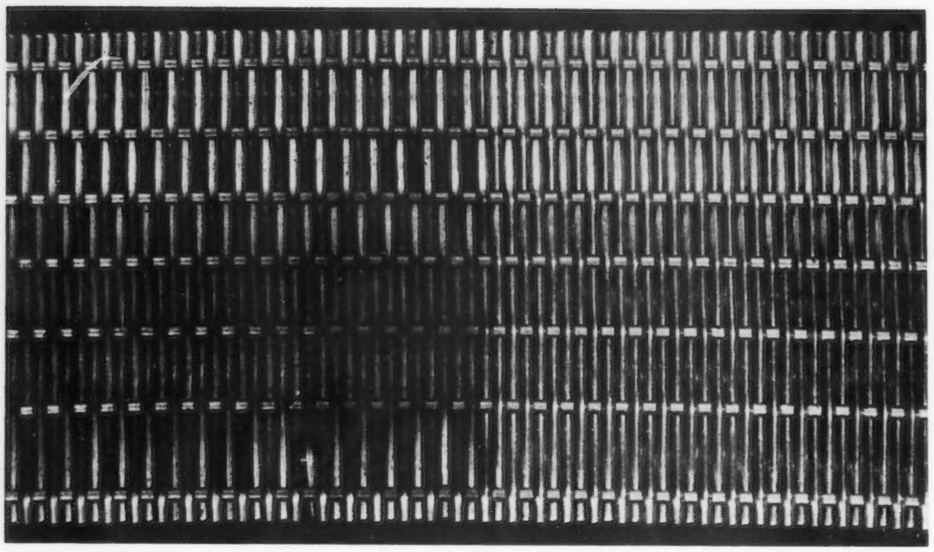


VACUUM cleaner housing before and after (right) pre-cleaning. Note that photo on right shows type of cleaning obtained by a short dip in emulsifiable solvent at room temperature, followed by a pressure rinse with cold water. The housing is ready for lacquering or for final cleaning before plating.



o o o

NOTE how the interstices of the right side of this object have been cleaned. It was dipped, drained, and then flushed off with a cold water pressure spray.

o o o

practice, buffing and polishing materials used on preceding operations, etc. He found that a change in type of oil instituted a few days before cleaning troubles became acute accounted for the failure of the cleaner. A new material, suited to the nature of the impurities introduced by the new lubricant, quickly set things right again.

Removal of grease, oil, smut, pigments and abrasives, or spacing agents such as emery, lithopone, lime, crocus, tripoli, rouge, etc.—this is the job of the pre-cleaning operation. And if excessive manual scrubbing and brushing processes to insure good cleaning are to be avoided, it is clear that a rather wide range of cleaning media would have to be available to meet the particular conditions set up by various combinations of lubricants and polishing compounds used in metal working operations prior to cleaning. That is, of course, unless some one dependable method can be devised which is generally applicable to all of these problems.

Innumerable attempts have been made to provide a broadly applicable answer to the problem, with only partial success. The pre-cleaning operation is tied in irrevocably with the final cleaning stage. And the latter is inexorably tied in with the plating process. A satisfactory degree of pre-cleaning may be accompanied by poor rinsing qualities in the cleaner, tarnishing or discoloring of the work or by excessive amounts of drag-over, affecting the working of the final cleaning solution. Pre-cleaning may do an almost perfect job. but as in the case of black smut on steel, leave a part of the deposits untouched, involving expensive and time-consuming hand-brushing operations before final cleaning. There is no single cure-all method or material for pre-cleaning. Not so long ago, the vapor degreaser, with its unique action and startling results, seemed for a time to come close to answering these problems. But it was soon found that there were definite limitations. The degreaser could remove only oil, grease, wax—substances freely soluble in the solvent used. Any solid particle dirt at all embedded in the surface of the metal remained largely untouched. Scouring, scrubbing and hand-wiping are usually required. In addition, the cost of vapor degreasing is comparatively high, aside from any manual operations required for suitable pre-cleaning where solid particle impurities must be completely removed. This is due not only to solvent costs and losses, but to the large amount of cooling water required for the system.

Any number of alkaline cleaners and specially compounded cleaners depending on the detergent, wetting, penetrating and dispersing properties of various wetting agents have been used for pre-cleaning, either in still tanks, or washing machines. Again, wide variations in cleaning results have been obtained, ranging from almost perfect results to complete failure, depending not only on the nature of the impurities to be removed, but on the ingredients of the cleaners. The function of these specialized alkaline cleaners in pre-cleaning is not only the removal of grease and oils by penetration of deposits and their emulsification and dispersal, but rapid and effective penetration to the metal surface so as to loosen solid particle dirt and render it capable of being flushed or rinsed off with the cleaning solution. The difficulty has been and still is, thoroughly effective wetting and penetration, so that the pigments, abrasives, metal particles and other foreign matter are removed without necessity for subsequent hand scrubbing or wiping.

At the same time, two other factors must be considered. The first is the effect of the cleaner, particularly its alkaline ingredients, on the metal. If the pH of the solution is too high, tarnishing and discoloration are apt to take place, particularly when the duration of the cleaning operation must be long to get adequate cleaning effect on solid particle dirt. The other factor is the rinsing quality of the cleaner. Many modern cleaners (based on the use of suitable wetting agents) provide exceptional rinsing qualities, because the same properties of rapid wetting of the work and dirt, imparted by the wetting agent, also insure rapid and thorough rinsing of the cleaner when the time comes for rinsing.

What appears to be a very satisfactory solution of the pre-cleaning problem is the emulsifiable solvent method, developed a few years ago. This cleaning method depends on the use of an emulsifiable solvent,

readily miscible with oils, which not only degreases the work, but penetrates and wets the solid particles to such an extent that they are completely loosened from their bond with the metal surface and can be flushed off the surface, together with the emulsion, with plain water, leaving a physically clean metal surface, ready for final cleaning before plating.

These emulsifiable solvent cleaners are exceptionally easy to use. They are supplied in the form of concentrates, to be mixed with safety solvent to make up the cleaning solution. The work to be cleaned is immersed at room temperature for a short time in this solution, usually no longer than 5 min., and more frequently a minute or so. It is then removed, and allowed to drain a few minutes so that excess solution drains back into the cleaning tank. The work is then pressure spray rinsed with cold water, either in a spray tank, washing machine or spray booth. The solution may be used slightly warm, but usually not over 140 deg. F. Work comes from the spray so clean physically that it is ready for painting or lacquering.

Further cleaning is needed for plating or similar finishing operations requiring a chemically clean surface. A hot water rinse is often used, where it is desired to have the work dry off rapidly, but cold water will give completely satisfactory results. By this pre-cleaning most solid particle dirts, particularly smut, lithopone and other hard-to-remove pigments, and crocus or tripoli, are removed without any need for hand wiping, scrubbing or brushing. Subsequent cleaning operations prior to plating are greatly simplified, since the work has no surface dirt to contaminate final cleaning solutions, and this cleaning operation is usually so rapid that a 30-sec. dip in an electrocleaning solution or a similarly short cleaning in a still tank insures a perfect cleaning job without a trace of staining or water break.

THIRTY-FIRST in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

Pre-cleaning assumes particular importance for those who are using the new high current density, and anodic cleaning methods. By materially shortening the necessary electro-cleaning time, appreciable savings are made in current costs. With high current density cleaning, more highly concentrated electrolytes are used than usual, with correspondingly higher replacement cost. Avoidance of loading them with dirt shows saving through less frequent replacement. And probably most important, more reliably clean work can be brought out of a clean tank than one heavily loaded with floating oil and suspendel dirt.

Experience of users has shown that this emulsifiable solvent cleaning solution has an exceptionally long service life, since it can stand considerable contamination from grease and oil without affecting its cleaning qualities and is not adversely affected by concentrations of solid particle dirt which would render ordinary cleaning solutions useless. Records show that such solutions have been used for months, with occasional make-up with safety solvent and the cleaner concentrate. The group of concentrates available covers cleaners suited to all types of commercial metals, including steel, stainless steel, monel, copper, brass, bronze, aluminum, duralumin, zinc, lead and tin. These concentrates are particularly attractive in that neither they, nor their solutions in safety solvent, have any action on any metal. Moreover, they avoid the use of low flash point inflammable solvents and in addition are non-toxic and without powerful or unpleasant odors.

The shape of the work is an important factor in determining whether or not the emulsion-solvent method can be economically used. Work can be readily and economically cleaned by this method, if it does not contain too many wells or pockets, which make speedy and fairly complete drainage possible. Where such pockets exist, the cost of dragout may make the method rather expensive, and besides, adequate rinsing, even with the pressure spray, may be difficult. This same condition applies to all work where wells or pockets make drainage slow or difficult. Small parts which must be handled in bulk can only be pre-cleaned by this method if rinsed in a tumbling barrel. The method is also not applicable to work that is wet with water.

In most cases, however, where the shape of the work lends itself to good drainage, the emulsifiable solvent method of cleaning offers heretofore unattainable cleaning speed, plus removal of all surface dirt, including embedded solid particles of all kinds without need for hand-cleaning operations.

Quality plating at today's required production rates demands much more attention to pre-cleaning, because most of the troubles a plater faces, due to poorly cleaned work, are due to solid particle dirt that has not been thoroughly removed. Since practically any cleaning method designed to produce the chemically clean surface required for modern high current density plating works better and at much lower cost if the work has been properly pre-cleaned before the final cleaning operation, it seems obvious that every executive responsible for production where plating is involved will find it definitely to his advantage to take a fresh look at his cleaning methods to assure himself that pre-cleaning is given the prominence it deserves in his plant.

Heat Treating Facilitated

THE heat treating department of the Claremont, N. H., plant of the Sullivan Machinery Co. is housed in a separate building in which the equipment is carefully arranged to provide ample space for the operators and for mechanical handling machinery. The parts treated here range from those weighing a few ounces to others weighing several hundred pounds, which of course calls for much versatility in operation. This versatility also makes it possible for the department to take in heat treating work from various neighboring concerns.

In order to explain the layout of the mechanical handling equipment in the heat treating department it will be necessary to give a brief description of the heat treating equipment in service, how it has been arranged and how it is used. This includes equipment to forge, straighten, anneal, carburize, heat treat, draw and sandblast the various parts. There is also a metallurgical laboratory where incoming steels are checked. There are various testing machines to check the parts to be sure that they have been correctly treated before they are transferred for subsequent operations, or to stock as finished work.

Heat treating operations are carried on in adjoining sections devoted to different kinds of work. The types of equipment for the heavier work consist of large General Electric furnaces of the RRB-36 type, with a carburizing chamber 36 in. wide by 84 in. deep; and also of the PRB-24 type, with a chamber 24 in. wide by 54 in. deep. These furnaces are also used to treat various kinds of work when not used for carburizing.

The furnaces are served by a hand traveling crane which gives a flexible means of handling the carburizing pots in and out of the furnaces. It is, of course, also used for handling heavy parts undergoing heat treatment, and in connection with a large water cooled oil quenching tank in the floor which is suitable for parts such as shafts 6 in. in diameter by nearly 8 ft. long.

Equipment has been provided especially for handling the carburizing pots. The fabricated pots made in the company's welding department are being discontinued in favor of Q-Alloy pots in order to reduce maintenance by the elimination of scale and speeding up the carburizing cycle as the result of reduction in thickness of pot wall. The pots have legs to permit better heat circulation underneath and to facilitate handling with tongs. The latter are made with a fork to slip under the pots and a bail to prevent tipping of the pot while being moved. They are also provided with two wheels for ease in loading and unloading the furnaces.

At times it is necessary to handle pots weighing as much as 1000 lb. to 1200 lb., which calls for special equipment as shown in Fig. 1. This "buggy" was built in the plant of obsolete parts. As will be seen, the counter-weight in the compartment over the wheels balances the large pot on the other end and is carried by the wheels after the pot is unloaded. The large eye in the center is for handling by the traveling crane.

In addition to the G. E. furnaces there is a W. S. Rockwell Co. rotary electric furnace which was installed to shorten the carburizing cycle in the heat treatment of links forming the cutter chains for coal cutting machines. A saving of over 50 per cent was realized by this furnace over box type carburizing due to the elimination of the packing and unpacking operations and the reduction of the carburizing cycle from 9½ hr. to 4½ hr. Another use for this furnace is the

FIG. 1 — Carburizing furnace, showing "buggy" for handling hot pots.

By Mechanical Handling

spheroidizing of drill bit forgings before machining. The retort is of Q-Alloy which gives long service for these operations.

One of the most interesting features of this furnace is the conveyor which has been installed in front of it, as shown in Fig. 2. This photograph was taken just as a load of carburized links was being discharged. It was designed and built at the plant. The purpose is to remove the links from the furnace quickly and at the same time to perform an air cooling cycle in their heat treatment. The links slide on to an apron made as a grid to permit the hot carburizing compound to drop into a container below, after which an operator pushes the links down to the conveyor. The latter is moved until the heated parts are distributed along its length, when it is stopped and allowed to remain until the spread out parts have cooled. When the parts are cool the conveyor is again started and the links drop off the upper end into a tote box to be moved to the hardening furnaces. A similar operation is performed at lower temperatures for the spheroidizing of drill bits.

The frame of this mechanical cooling unit is of welded steel construction and is very substantial. The conveyor is made of two Link-Belt chains, one on each side, to each link of which an angle has been welded. Steel strips about ½ in. thick, 3 in. wide and 3 ft. long have been welded to these angles to form the conveyor. The strips are about 1 in. apart. The drive of course must be very slow and consists of an individual motor, a Foote gear speed reducing unit and a Link-Belt silent chain drive with a further reduction in speed.

In this department there is also a G. E. furnace for smaller work, as well as a small oil-fired hardening furnace and a larger oil-fired annealing furnace.

It should be explained that in all carburizing heats, test pieces of the same type of steel that is being carburized are placed in the pots. Before anything further is done with the parts the test piece is hardened and fractured and then examined to see if the depth of case is correct. This check of course serves the double purpose of saving time and materials as well as insuring quality of product.

The layout of the small parts heat treating department is shown in Fig. 3, and a general view in Fig. 4. The equipment is arranged in three lines with monorail hoist conveyors located as shown in the diagram. The photograph shows part of the double monorail in the center line from the soda tank to the oil and water tanks. As the small parts treated here are mostly handled in baskets, the monorail hoists greatly facilitate their movement. The center line of equipment is serviced by a double monorail so that materials in process may be moved in either direction, thus avoiding congestion.

The quenching tanks, it will be noted, are located between the Tate Jones, Gilbert & Barker and Hayes furnaces on one side and the G. E.

By A. V. DENNISON

Heat Treating Foreman, Sullivan Machinery Co., Claremont, N. H.; and

FRANCIS A. WESTBROOK

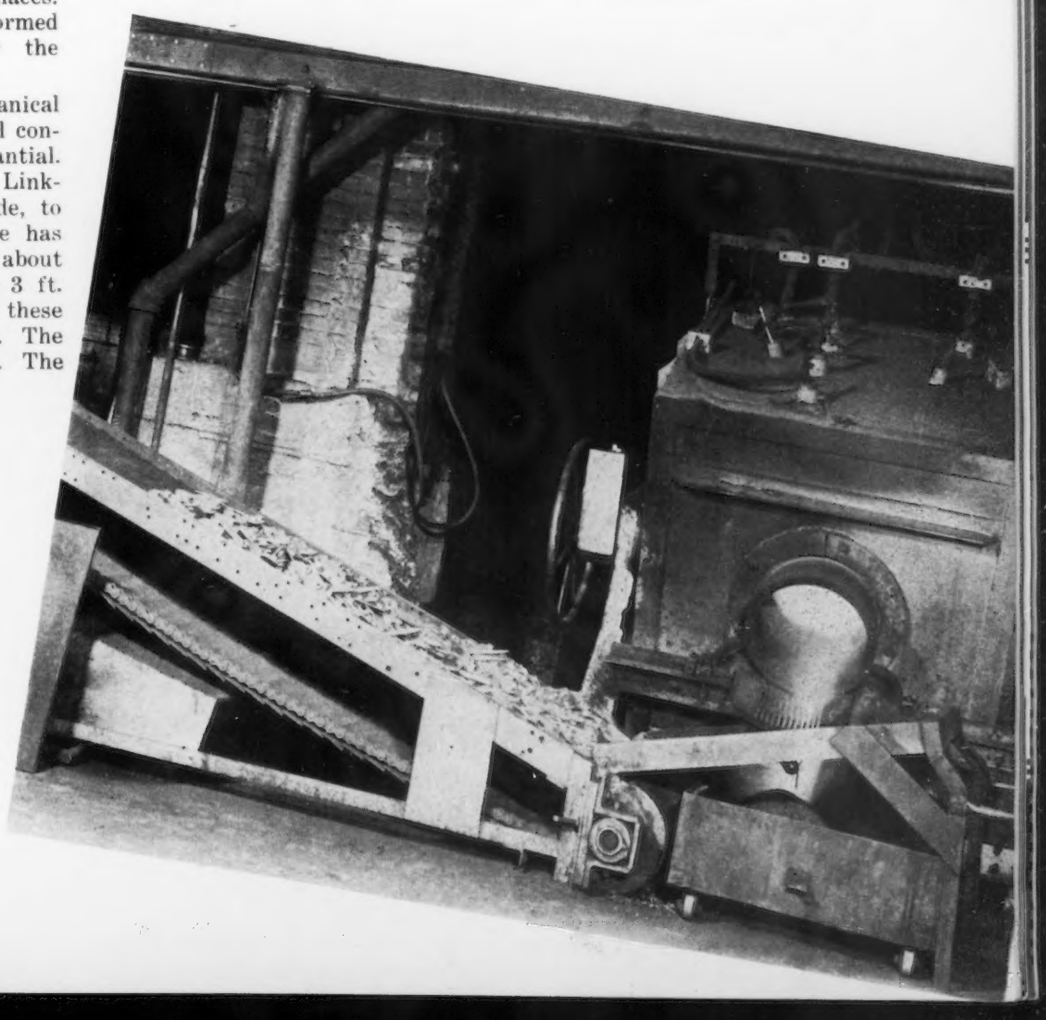


FIG. 2 — Carburizing furnace, with endless belt conveyor for handling hot pieces.

and Gilbert & Barker units on the other; so it is an easy matter to take the charge from any of these and place it in one of the tanks. It will be seen that there is a short monorail from the G. E. furnace at the end of the line to the opposite tank for moving especially heavy charges. The monorails over the tanks are then used for carrying the filled baskets away, and of course any of the monorails may be used to bring in work for heat treating.

The sand blasting equipment is located along one side of the room and consists of three units, namely, a rotary table unit, a barrel sandblaster and a cabinet hand blast, all made by W. W. Sly Mfg. Co. These units are reasonably close to the center monorails, from which the parts may be readily moved after the sandblasting operation.

The hardening section of the heat treating department has a large soda tank for the washing of oil treated parts, built in the plant. Its location is shown in Fig. 3. This tank has an outer shell which provides for a 6-in. wall of Sil-O-Cel between it and the inner tank. A heating coil is hung on one side with a baffle plate in front having 1½-in. diameter holes which cause circulation of the solution across the tank. Another advantage of having the coil on the side is that it permits of ready access to the bottom of the tank for the removal of scale.

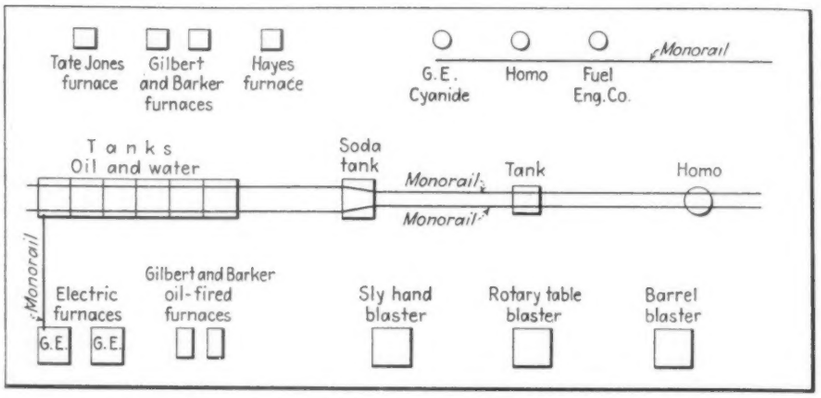


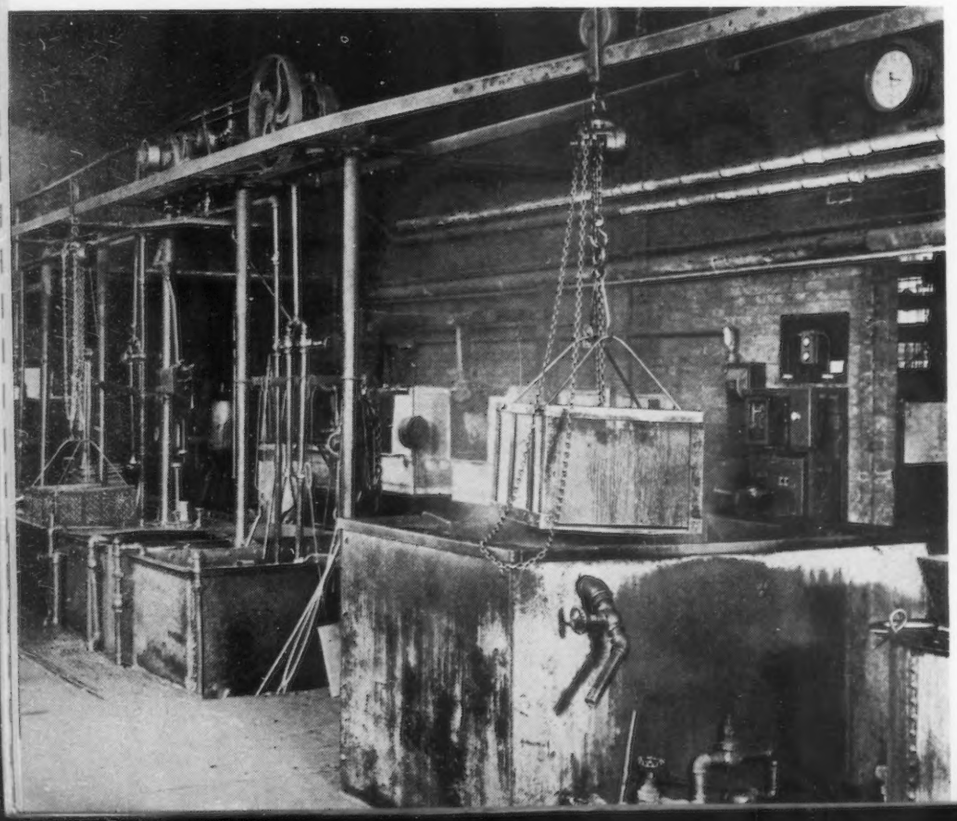
FIG. 3—Layout of heat treating equipment for small parts, and of sand blasting equipment.

There are two pusher type oil fired automatic furnaces in this department for heat treating detachable drill bits. A magazine slide at the back of each furnace is kept filled by an operator while at the front, as the bits fall out, another operator places them on a special quenching jig suitable for the type and size of bit being treated. The bits are passed over an alloy track in the furnace at a uniform rate by means of a cam arrangement which is graduated for adjustment to time the cycle for each size of bit. Bits are regularly tested and fractured twice a day to assure uniform hardening and also to detect any trouble in the steel. These furnaces were designed and made at the plant.

All electric furnaces are controlled by Leeds & Northrup instruments calibrated for Hoskins thermocouples, some of which have Micromax controls. All oil-fired furnaces have complete Leeds & Northrup equipment, including the thermocouple. To insure against errors from incorrect heats the couples are checked regularly with a Leeds & Northrup optical pyrometer.

The fact that, as previously explained, the heat treating department is located in a building by itself means that the parts to be treated must be brought from other buildings in the plant and returned to them for further processing. Consequently adequate transportation must be provided. This is done by power lift trucks of Elwell-Parker and Automatic Transportation Co. make, of which there are several of each in service. They are, of course, also used for moving heavy parts or lots from one operation to another within the heat treating department and other departments. They are equipped with Edison storage batteries. Skid platforms and boxes with skid bases are provided for use with the lift trucks, and a feature of the heat treating department is that ample floor space has been provided for platforms and boxes carrying work before and after operations are performed and for cooling. Thus an accumulation likely to cause undue congestion is very unlikely.

FIG. 4—Monorail cranes over quenching tanks in heat treating department.



Defense Keynotes AFA Meeting

BROUGHT together by a common desire to thrash out the numerous perlexing problems facing the foundry industry today, more than 2000 foundrymen from all parts of United States and Canada gathered last week at New York for the 45th annual convention of the American Foundrymen's Association.

While the defense effort sounded a somber motif over the entire meeting, studies and discussions of the everyday, practical problems of producing sound castings economically constituted the chief formal activity of the convention. The lighter overtones supplied by the social activities developed by the convention committee of the Metropolitan Chapter, host at this year's convention, provided a welcome respite from the weightier problems of the moment.

Questions of material shortages, substitutes, priorities, labor shortage and apprentice training were hashed over in many informal meetings. The matter of shortages in non-ferrous metals and plans for developing cooperation with the OPM were discussed at a special meeting called on Tuesday.

Herbert S. Simpson, president of National Engineering Co., Chicago, and vice-president of the association in the past year, was elected president of the A.F.A. at the annual business meeting on Wednesday. Duncan P. Forbes, president and general manager of Gunite Foundries Corp., Rockford, Ill., was chosen vice-president.

New directors selected at the meeting were as follows: R. J. Allen, Worthington Pump & Machinery Co., Harrison, N. J.; M. J. Gregory, factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill.; William J. Corbett, vice-president and works manager, Atlas Steel Casting Co., Buffalo; James G. Coffman, plant manager, Los Angeles Steel Casting Co., Los Angeles, and L. N. Shannon, vice-president and works manager, Stockham Pipe Fittings Co., Birmingham, Ala., and retiring president of the association.

C. E. Westover, operations manager of Burnside Steel Foundry Co., Chicago, was named executive vice-president and treasurer of the association, to succeed C. E. Hoyt. Mr. Westover will assume his new duties on July 1, while Mr. Hoyt will continue as manager of exhibits for the association.

Mr. Westover comes to the association well qualified to carry on the multiple duties of executive vice-president. His past experience includes service with the Omaha Steel Works, American Brake Shoe & Foundry Co., Otis Elevator Co., Farrell-Cheek Steel Foundry Co., and the Burnside Steel Foundry Co. In 1939 he served as chairman of the Chicago chapter and has been active on many committees of the association.

The board of directors also reappointed R. E. Kennedy secretary, N. F. Hindle assistant secretary, E. O. Jones director of safety and hygiene and Jennie Reininga as assistant treasurer.

Presentation of gold medals in recognition of outstanding contribution to the foundry industry was made to D. J. Reese, F. L. Wolf, M. Kuniansky and C. E. Hoyt at the business meeting. Mr. Reese, of International Nickel Co., was awarded the J. H. Whiting gold medal by General Thomas Hammond of Whiting Corp., and Mr. Wolf received the William H. McFadden medal from Dr. G. H. Clamer of Ajax Metal Co. The John A. Penton gold medal was presented to Mr. Kuniansky, of Lynchburg Foundry Co., by H. Bornstein of Deere & Co.

In addition to the Joseph S. Seaman gold medal, C. E. Hoyt, executive vice-president of the associa-

New A.F.A. Officers

H. S. SIMPSON

New president of A.F.A. is president of National Engineering Co., Chicago.

D. P. FORBES

New vice-president of A.F.A. is president of Gunite Foundries Corp., Rockford, Ill.

tion received a token from the A.F.A. membership and a radio from the members of the Foundry Equipment Manufacturers' Association. The presentation of the radio, which was made at the banquet on Wednesday, was typical of the many unscheduled expressions of appreciation tendered Mr. Hoyt, who has been active in foundry circles since the turn of the century. As a token of his appreciation of the cooperation provided him by the association's headquarters staff at Chicago, Mr. Hoyt presented bronze replicas of the Seaman medal to Bob Kennedy, secretary, Norm Hindle, assistant secretary and J. Reininga, assistant treaturer.

Recognition of the long and meritorious services to the industry of Henry M. Lane and L. N. Shannon, the retiring president, was voted at the meeting and honorary life membership in the association was granted the two foundrymen.

Aids Defense Work

The importance of the association in preparing the foundry industry for its share of the defense effort was stressed by L. N. Shannon, the retiring president, in his presidential address. He pointed out that through the technical publications of the association, an important source of information for plants embarking upon defense work was provided. The apprentice training programs of the association, which were pushed for many years before the present labor crisis, has proven a source of vital data in the current emergency, Mr. Shannon said.

The association now has some 20 chapters, including one in Canada, which hold about 200 meetings a year. The information disseminated at these meetings Mr. Shannon pointed out, should prove of immense value in furthering and expediting the industry's share of defense work.

Mr. Shannon asked that technical research be maintained at top speed and that activity in developing effective foreman and apprentice training programs be stepped up in order that the foundry industry would be in position to assume its share of the defense program quickly and effectively.

He closed his address with a note of thanks to the national headquarters' staff and the individual committees and chapter members for their support during his term as president.

New Directors Chosen

L. N. SHANNON
Stockham Pipe Fittings Co., Birmingham.

R. J. ALLEN
Worthington Pump & Machinery Corp., Harrison, N. J.

The annual board of awards address was delivered this year by S. W. Utley, Detroit Steel Casting Co., who spoke on "This Industry of Ours."

The annual banquet, held Wednesday evening at the Hotel Pennsylvania was unusually well attended, with more than 400 foundrymen and their wives present. The featured speaker of the evening was Dr. Allan A. Stockdale, National Association of Manufacturers.

While defense restrictions acted to curtail the number of plants available for inspection by the visiting foundrymen, many foundrymen took advantage of their Eastern trip to visit the Otis Elevator plant at Yonkers, N. Y., the American Radiator Co. at Bayonne, N. J., and Nassau Smelting & Refining Co., at Tottenville, Staten Island.

The technical program this year covered an exceptionally broad field. The growing difficulty of obtaining sufficient numbers of skilled workers created more than usual interest in the sessions devoted to apprentice and foreman training.

William F. Patterson, chief of apprenticeship, Department of Labor, speaking at an apprentice training meeting, praised the industry for its long interest in apprentice training. "When, last June, the nation became conscious of its peril," he said, "the foundry industry was in a better position to meet the situation than many other industries." He warned, however, that despite all that has been done to spur training of skilled foundry hands, efforts must be still further intensified if the full demands of the defense program are to be met.

Between one-third and one-quarter of the workers still to be hired in defense plants will have to be skilled in more than three or four phases of the work to be done, Mr. Patterson asserted. A study of the skilled labor requirements of selected defense plants reveals that one-half of the men they will have to hire this year will have to possess all-round skill, with two-thirds of the remainder being semi-skilled and the balance unskilled.

In some fields the percentage of skilled workers required to insure the highest efficiency were said to be even higher. At least 60 per cent of the labor needs of shipyards must be in the skilled classification. The percentage for foundries was put at close to the shipyard figure.

The training of skilled labor remains the responsibility of indus-

by Foundrymen

M. J. GREGORY
Caterpillar Tractor Co., Peoria, Ill.

W. J. CORBETT
Atlas Steel Castings Co., Buffalo.

try, Mr. Patterson asserted, and the bulk of the training must be done on the job. No general training plan will fit all plants, but rather the general plans in use in other plants must be altered to suit the specific needs of the individual units, he said.

Machines can never be taught to think, Mr. Patterson said, and only through apprenticeship training can mechanics be developed with the required sixth sense to efficiently take their place in modern industry.

One of the reasons why many foundries were in such excellent position to face the many-fold increase in production was the open-minded attitude operators and craftsmen have maintained toward apprenticeship, the government official explained.

The extension of flame hardening to the malleable iron field was the subject of an interesting paper presented by S. Smith, Air Reduction Sales Co., New York. Mr. Smith's study of the subject led him to the conclusion that under proper controls, surface hardening of malleable could be successfully done and opened up new and larger fields of malleable use.

Flame hardening makes possible, he said, the production of a material possessing a combination of properties such as a hard wear-resisting surface and a tough ductile core. The ability of malleable to undergo various heat treatments was said to further add to the wide range of combined properties that may be obtained.

While the use of proper technique makes it possible to successfully flame harden all the various types of malleable iron in commercial practice, the paper was confined to the application of the oxyacetylene flame for irons whose structure consisted of ferrite and free carbon in the form of temper carbon, with or without various amounts of combined carbon in the form of pearlite or free cementite.

Rockwell hardnesses ranging from C42 to C58 were reported obtained on various types of malleable. File hardness was obtained on hardened malleable and cast iron at a hardness of Rockwell C55, while the equivalent hardness on a steel surface occurs at Rockwell C60.

Discussing the hardening of black-heart malleable, Mr. Smith pointed out that because of the great diffusion speed of temper carbon, it is possible to produce a surface hardness on black-heart malleable without materially affecting the core by employing the intense heat of the oxyacetylene flame for heating. This hardness may be produced in the following ways: (1) Heating in such a manner that the temper carbon will partially go into a gamma solution and from which martensite is formed on very rapid cooling, and (2) Heating to an appropriately high temperature and rapid cooling in which cementite hardening takes place through the crystallization of cementite.

Black-heart malleable iron, because of its ferritic matrix, is the most difficult to flame-harden successfully to obtain uniform hardness. The manner and duration of heating will determine the uniformity of hardness that can be obtained. It is essential to heat at such a rate as to allow the temper carbon to diffuse as uniformly as possible through the matrix before quenching. Successful accomplishment of this will produce a martensitic structure and maximum surface hardness.

Hardening Technique

Maximum hardness is more readily accomplished by heating and quenching. A proper size burner is selected which will produce the approximate surface temperature in the required time necessary to effect a uniform diffusion of the temper carbon through the matrix. The heating time generally will be less than one minute. Longer heating time will cause the heat to soak into and affect the core. Very rapid heating, on the other hand, will cause the temper carbon to dissolve in the matrix and will result in the formation of cementite and cementite hardening on quenching.

Martensitic hardening of black-heart malleable iron is more difficult to produce by the progressive flame-hardening method, as the time of heating is relatively short, casting sections are relatively thin and the amount of heat necessary to produce a case hardness is relatively large. Slow speeds on thin sections will cause complete heat penetration, thereby affecting the core structure. Slower hardening speeds giving longer heating time can be successfully used on the thicker sections only.

Martensitic hardening is also difficult to accomplish on castings containing a skin or decarburized surface. In heating such a surface in progressive flame-hardening, it is possible to obtain a martensitic structure just below the decarburized surface, while at a still greater depth, cementite hardening will occur.

Pearlitic malleable irons, because of the nature of the matrix, con-

taining combined carbon of various contents, require simply heating and quenching to produce satisfactory martensitic hardening. Here, as with black-heart malleable, cementite hardening also may be accomplished by heating to appropriately high temperatures. When appreciable amounts of free ferrite compose the matrix, a slightly longer time of heating is required to produce maximum hardness. Because of the rapid diffusion of the temper carbon, this time is relatively short, amounting to a few seconds as previously shown.

Quenching Medium

Slightly higher hardness results are obtained by hardening in oil rather than in water; however, oil can be used in the heating and quenching method only, wherein the part is dropped into an oil bath after heating. Oil is excluded from the progressive hardening method because of its flash characteristics.

When it is not required to obtain maximum surface hardness, a soluble oil solution may be used for quenching in progressive hardening. It is an excellent quenching medium, but requires a pumping system to supply it to the quenching jets under pressure, as well as a suitable tank for receiving the coolant after using.

Compressed air, under various pressures, may be used as a quenching medium, but it is more difficult to control and distribute evenly over the surface to produce a uniform quench.

Flame-hardening, like all new processes, is subjected to misapplications, according to Mr. Smith, particularly with respect to parts unsuited in shape or section to the process. When flame-hardening is contemplated, parts should be designed to permit the use of the process to the best advantage. Wherever possible, all sections to be flame-hardened should be uniform in thickness. Variations in mass, particularly when using the progressive method of flame-hardening, will cause variations in surface temperature and depth of hardness, and will result in unequal cooling, a non-uniform structure in the case, and distortion.

The surfaces to be flame-hardened should be simple in shape, to permit the simplest type of burner to be used. Large surfaces, containing projections greater than 1/16-in. high, should be avoided when progressive hardening is required, as the projections will heat faster than the lower surface and overheating of the projections will result. Where hardness in corners or grooves is desired, generous fillets should be introduced.

Achievements Honored

D. J. REESE

International Nickel Co., Inc., New York.

C. E. HOYT

American Foundrymen's Association, Chicago.

The addition of rebonding sand to the molding sand mix in the form of a clay slurry, which resulted in better sand mixtures at lower cost, was described in a paper presented at one of the sand sessions by R. H. Mooney, Saginaw Malleable Iron Division, General Motors Corp. One of the causes for the experiments in the use of a slurry was that of the clay balls encountered in the dry method of adding clay previously used.

After experimenting with various mechanisms for handling and distributing the slurry, the following system of handling was developed. Clay storage bins were located about 30 ft. above the ground and are filled with a dump bucket and hoist that serves several other bins. This height was chosen as it permitted maintenance of an 18 to 20-ft. head at the slurry discharge point. The quantity of slurry is determined by the amount of water required to maintain the desired moisture content of the sand system and is controlled by the system sand man with a plain lug cock with graduated dial.

A motor driven agitator runs continuously. The water supply to the tank is controlled by the float switch and solenoid valve, and the float is set so that the height of slurry will vary within 8 to 16-in. of the top. The float switch also controls the "on" "off" operation of the vibrating clay feeder, resulting in the clay being fed into the tank simultaneously with the water each time the float calls for water. The bond strength of the sand system is maintained by varying the rate of raw clay fed into the tank by the vibrating feeder.

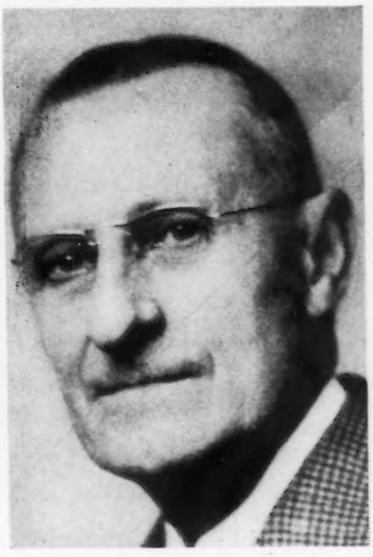
The slurry is then fed from the mixing tank (about 200 gal. capacity) by gravity to the continuous muller. This method was found to eliminate difficulties encountered with previous setups.

The only operating trouble experienced with this latter set-up was a plugging up of the slurry line, due to lumps of foreign material, such as coal, stones, etc., becoming lodged at a bend or at the control valve. This was soon eliminated by the installation of a screen inside of the tank at the clay slurry outlet. The tanks are left full overnight and over weekends, and every three or four weeks are emptied to remove any accumulation of foreign material.

Summing up his investigations, Mr. Mooney said that in comparison with former practice, the continual handling of sand to and from sand systems and the mixing of rebond mixtures was eliminated completely.

by Foundry Industry

M. KUNIANSKY
Lynchburg Foundry Co., Lynchburg, Va.



FRED L. WOLF
Ohio Brass Co., Mansfield, O.

This amounted to approximately 90 tons per day for the three sand systems in a 16-hour day, whereas, now it is necessary to haul only approximately 13 tons of clay to the sand systems daily, and all cost of mixture preparation is eliminated. Control of the moisture content and bond strength of the molding sand system was definitely more uniform.

The type of clay used was same as had been used for years previous. This was a medium priced clay ground to a fineness where approximately 25 per cent would be retained on a 100-mesh, 25 per cent on a 200-mesh and 50 per cent would pass through a 200-mesh. Trial runs were made on a few of the more expensive clays which were ground so that 90 per cent would pass through a 200 mesh, but it was found that the same quantity of clay would be required as when the less expensive material was used.

The author expressed the opinion that much more can be done in connection with the use of various clays, or combination of clays in connection with the slurry method of addition and experiments along this line were being conducted. Some thought, he said, was also being given to the addition of seacoal, or a substitute, by this same method, but no work on this had been done as yet.

With the use of radiography gaining impetus under the defense program, the report of Steel Division Committee on Radiography was received with considerable interest. The committee reported on the result of a questionnaire mailed to 190 steel foundries to determine their attitude on the subject of radiographic examination.

The returns amounted to about 41 per cent of the questionnaires sent out, as compared with a 20 per cent return in the previous questionnaire in 1938. The committee interpreted this higher return as indicative of the growing interest in the subject.

Of the 79 responding, 42 stated they had used radiography. The committee expressed the view that in the light of this return, plus other data available, they believed that 22 per cent of the steel casting producers have had actual radiographic experience. A tabulation of answers to some of the questions follows:

1. Has your organization used X-ray or Gamma ray non-destructive testing in the manufacture or inspection of steel castings?

	1941	*1938*
Yes	42	19
No	37	30

2. Which method are you using?

X-rays	9
Gamma rays	29
Both	4

3. Will you take orders for castings that are subject to radiography?

Yes	45
No	18
Failed to answer	16

4. Have your customers used X-ray or Gamma ray radiography for inspection?

	1941	*1938*
Yes	37	22
No	19	17
Failed to answer	23	10

5. Have the results of this inspection been mutually satisfactory?

	1941	*1938*
Yes	36	13
No	14	9
Failed to answer	6	0

6. Do you believe that the gamma ray standards of the Navy Department for steel castings for steam pressure service are:

Too lenient	1
Fair	14
Unnecessarily strict	4
Comprehensive enough	
Adhered to, if used	1
In need of more clarification	15

7. Would you welcome the adoption of these standards by the American Society for Testing Materials?

Yes	18
No	18
Failed to answer	43

8. Would you be willing to use those same standards for services other than steam pressure?

Yes	17
No	18
Failed to answer	44

9. Has radiography been instrumental in causing beneficial improvement in manufacturing methods?

	1941	*1938*
Yes	35	12
No	5	4
Failed to answer	2	3

10. Would you be willing to use radiographic examination in production work to improve casting technique?

	1941	*1938*
Yes	52	37
No	9	6
Failed to answer	18	6

11. Size of largest regularly produced castings:

	1941	*1938*
½ to 100 lb.	12	6
100 lb. to 1 ton	21	13
1 ton to 5 tons	17	14
5 tons to 10 tons	12	6
10 tons to 25 tons	2	6
Above 25 tons	7	4

12. Types of castings produced to radiographic requirements.

Ordnance	15
Steam	15
Ship	13
Refinery	10
Airplane	7
Hydroelectric	5
Heat and Corrosion	4
Automobile	2

1500 TOOL STEELS

THIS is a continuation from last week of the indexing of approximately 1500 tool, metal cutting and die steels, and sintered carbides. In some instances the same steel is shown under several variations of the same name, in conformity with shop practice; the same steel is on occasion listed under a manufacturer's name and under a distributer's name; occasionally steels no longer made are indexed for the sake of full coverage; and, of course, some imported steels indexed are for the time being unobtainable. Thus, this indexing of all known tool steels should have maximum application in enabling users to locate and ascertain the properties of any steel produced in this country. This indexing of steels will be continued in successive issues of THE IRON AGE until completed.

Cemented Carbide
General term covering sintered nonferrous materials of extreme hardness, used as cutting tools, dies, and many other applications requiring near-diamond hardness, resistance to wear, resistance to acids, etc. Made in many grades, such as tungsten, or tantalum, or titanium carbide, or tungsten-titanium carbide, etc. See trade names: Carboloy, Kennametal, Widia Metal, Ramet, Vascoloy-Ramet, Tantung G, Talide, Teco, Firthaloy, Firthite, Strauss Metal, Willey's Tungsten Carbide, Perdurum, Phoran, Hartmetall.

Cesco Diamond Special
Oil or water hardening chisel steel, for chisels, rivet sets, mine bits, shock tools, stamps and dies. Has high tensile strength and resistance to fatigue and abrasion. Contains C 0.55, Mn 0.90, V 0.45, Mo 0.60, Si 1.85. Crucible Electric Steel Co., Homestead, Pa.

C 55
Oil hardening die block steel, containing C 0.50, Cr 0.75, Ni 1.25, Si 0.30. Heppenstall Co., Pittsburgh.

C-4
A special alloy hot die steel, containing Cr and V. Delaware Tool Steel Corp., Wilmington, Del.

C. F. S.
Water hardening die steel, for dies, drills, mandrels, punches, reamers, taps, etc. Contains C 1.00, Cr 0.70, Mn 0.25, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Champion Extra Tool
Alloy tool steel, for cutters, deep drawing tools, hobs, punches and blanking dies, reamers, shear blades, taps, threading dies, etc. Contains C 0.90 to 1.30, W 1.25. Crucible Steel Co. of America, New York.

Champion Non-Changeable
Oil hardening, non-deforming steel, for bakelite molding dies, broaches, gages, hobs and other forming tools, master tools, reamers, stamping and blanking dies, etc. Contains C 0.90, Cr 0.50, Mn 1.15, W 0.50. Crucible Steel Co. of America, New York.

Channeler
A water-hardening channeler bar steel; for stone cutting tools, paving drills, channeler machine bits, augers, etc. Contains about C 1.00, Mn 0.50, Si 0.25, P 0.025, and S 0.030. Tennessee Coal, Iron & Railroad Co., Birmingham.

Checkno Tool Steel
Hot work steel. Contains C 0.40, Cr 3.50, V 1.00, W 0.6. Bissett Steel Co., Cleveland.

Chimo
Air hardening steel, for chisels and punches. Has high resistance to fatigue. Contains C 0.50, Mn 1.00, V 0.25, Mo 2.20, Si 2.00. Firth-Sterling Steel Co., McKeesport, Pa.

Chippaway
A regular carbon steel. Jessop Steel Co., Washington, Pa.

Chippaway
A plain carbon steel. Edgar T. Ward's Sons Co., Pittsburgh.

Chiz-Alloy
A special alloy steel, containing Cr, W and Mo. Kloster Steel Corp., Chicago.

Choice
A special alloy hot work steel, containing Cr. Vanadium-Alloys Steel Co., Latrobe, Pa.

Choice Drill Rods
A plain carbon steel. Hobson, Houghton & Co., Inc., New York.

Choice XX
A plain carbon steel. Hobson, Houghton & Co., Inc., New York.

Chrome B-15
Oil or air hardening, non-deforming steel for dies. Contains Cr 15.00. Hidalgo Steel Co., New York.

Chrome Die
A special alloy steel, containing Cr. Allegheny Ludlum Steel Corp., Pittsburgh.

Chrome Hot Work
A. Milne & Co., New York.

Chro-Mow
Hot work steel, for punches and dies. Contains C 0.35, Cr 5.00, Mn 0.40, W 1.25, Mo 1.50, Si 1.00. Crucible Steel Co. of America, New York.

Chrome Roll
A special alloy steel. The Midvale Co., Philadelphia.

Chrome Vanadium
C-C-V-Steel for general purposes, containing C 0.46-0.85, Cr 0.60-0.80, Mn 0.35-0.50, V 0.15-0.25, Si 0.10-0.35. Braeburn Alloy Steel Corp., Braeburn, Pa.

C. H. W.
Tungsten hot work steel, for brass forging dies, blanking dies, drawing dies, punches, shear blades, trimming dies. Has resistance to heat checking. Contains C 0.50, Cr 2.75, Mn 0.25, V 0.50, W 15.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Circle C High Speed
Super high speed steel, for difficult machining operations, containing carbon as required, Cr 4.50, Co 9.00, V 2.00, W 18.50, Mo 1.00. Firth-Sterling Steel Co., McKeesport, Pa.

Clarite
Standard high speed steel for lathe and planer tools, shaper and cutting off tools, milling cutters, reamers, broaches. Available in several carbon ranges. Contains Cr 4.00, Mn 0.25, V 1.25, W 18.00, Mo 0.25, Si 0.30. Columbia Tool Steel Co., Chicago Heights, Ill.

Class E
A plain carbon steel. Edgar Allen & Co., Ltd., Montreal, New York.

Class H Steel
An extra carbon steel. Edgar Allen & Co., Ltd., Montreal, New York.

Clomo
Hollow drill steel, containing C 0.95, Cr 1.10, Mn 0.25, Mo 0.33, Si 0.30. Uddeholm Co. of America, Inc., New York.

C. L. W.
Tungsten hot work steel, for brass extrusion dies, heading dies, punches, shear blades, trimming dies. Has resistance to heat checking. Contains C 0.30, Cr 3.25, Mn 0.25, V 0.50, W 9.25, Si 0.40. Latrobe Electric Steel Co., Latrobe, Pa.

C. M. Tap
A special alloy steel, containing Cr and Mn. Vanadium-Alloys Steel Co., Latrobe, Pa.

C.N.S.
An air or oil hardening, non-deforming steel. Resists wear and corrosion. Contains C 1.55, Cr 11.5, Mn 0.30, V 0.23, Mo 0.80, Si 0.30. Jessop Steel Co., Washington, Pa.

Cobalt
High speed steel. Hidalgo Steel Co., New York.

Cobalt (Bonded Carbide)
A high speed steel, general purpose, containing C 0.74-0.78, Cr 3.50-4.00, Mn 0.15-0.30, Co 5.00-5.50, V 1.55-1.75, W 13.50-14.50, Mo 0.25-0.50, Si 0.15-0.30. Braeburn Alloy Steel Corp., Braeburn, Pa.

Cobalt-Alloyed Darwin-505
Oil hardening, improved high speed steel, containing C 0.70-0.75, Cr 4.50, Mn 0.30, Co 5.00, V 1.00, W 14.00, Mo 0.50, Si 0.35. Darwin & Milner, Inc., Cleveland.

Cobalt Chrome
Oil or air hardening die steel, for broaches, burnishing tools, blanking forming dies, gages, rolls, taps, valves, punches, etc. Has low distortion and high abrasive resistance. Contains C 1.35, Cr 12.50, Ni 0.30, Mn 0.25, Co 3.00, Mo 0.65, Si 0.45. Latrobe Electric Steel Co., Latrobe, Pa.

Cobaltcrom-KXK Stainless
Non-deforming, oil and air-hardening steel for all kinds of dies, press tools, airplane and oil pump valves, etc. Has resistance to abrasion and corrosion. Contains C 1.00, Cr 18.00, Mn 0.30, Co 1.10, V 0.20, Mo 1.10, Si 0.25. Darwin & Milner, Inc., Cleveland.

Cobaltcrom-PRK 33
Non-deforming, oil and air-hardening steel for all kinds of dies, press tools, airplane and oil pump valves, etc. Has resistance to abrasion and corrosion. Contains C 1.35, Cr 13.00, Ni 0.50, Mn 0.30, Co 3.50, Mo 0.70, Si 0.60. Darwin & Milner, Inc., Cleveland.

Cobalt Major
A high speed steel. Jessop Steel Co., Washington, Pa.

Coco Turning
A high speed steel, containing Co. Colonial Steel Co., Pittsburgh.

Colhed (or Colhead)
A special alloy steel. Vanadium-Alloys Steel Co., Latrobe, Pa.

Colonial Brands
Colonial No. 3 (hot work, contains W), No. 4 (contains W), No. 6 (contains Mn), No. 7 (contains V), Special No. 14. Colonial Steel Co., Pittsburgh.

Colosso
Water hardening steel, for chisels, shear blades, punches, etc. No drawing of temper. Contains C 0.30, Cr 0.30, Ni 0.50, Mn 0.65, V 0.10, W 0.30, Mo 0.60, Si 0.65. Hidalgo Steel Co., New York.

Colt Hot
A special alloy steel, containing Cr, Ni and Mo. A. Finkl & Sons Co., Chicago.

Columbia Brands
Columbia Special (special carbon), Extra (extra carbon), Standard (regular carbon). Columbia Tool Steel Co., Chicago Heights, Ill.

Co Major
A cobalt high speed steel. Jessop Steel Co., Washington, Pa.

Comet
A plain carbon steel. Carpenter Steel Co., Reading, Pa.

Como
A high speed steel, general purposes, containing C 0.74-0.79, Cr 3.75-4.25, Mn 0.15-0.30, V 1.25-1.50, W 1.30-1.80, Mo 8.00-9.50, Si 0.15-0.30. Braeburn Alloy Steel Corp., Braeburn, Pa.

Comokut (or Comocut)
A cobalt high speed steel for cutting tools, containing C 0.73, Cr 4.50, Mn 0.25, Co 5.00, V 1.25, W 18.25, Mo 0.75, Si 0.25. Bethlehem Steel Co., Bethlehem, Pa.

Composite
A plain carbon steel. H. Boker & Co., Inc., New York.

Composite Die
A plain carbon steel. William Jessop & Sons, Inc., New York.

Conqueror
Water hardening steel for stone drills and tools, punches, chisels, dies, pneumatic tools, etc. Has good wear resistance and hardness, and is tough. Contains C 0.80 to 1.00, Mn 0.40, Si 0.30. Lehigh Steel Co., New York.

Conqueror Hollow Drill
Steel for hollow stone drills for pneumatic machines. Has good abrasion and shock resistance. Contains C 0.75, Mn 0.30, Si 0.20. Lehigh Steel Co., New York.

Constant
Non-deforming die and gage steel. Contains C 0.75, Cr 0.50, W 0.50. Midvale Co., Philadelphia.

Corinth
A general purpose carbon tool steel, containing C 0.70 to 1.10, Mn 0.30. Allegheny Ludlum Steel Corp., Watervliet, N. Y.; also Edgecomb Steel Co., Philadelphia.

CR
A special alloy steel, containing Cr. Poldi Steel Works, New York.

CR 2
A special alloy steel, containing Cr. Poldi Steel Works, New York.

Crasco Green Label
Water hardening steel for general tool and die work. Contains C 0.95 to 1.05, Mn 0.20 to 0.35, Si 0.15 to 0.25. Craine-Schrage Steel Co., Detroit.

Crasco No. 7
Water hardening steel, for general tool and die work. Contains C 0.95 to 1.10, Cr 0.55 to 0.75, Mn 0.40 max., V 0.15 min., Si 0.15 to 0.25. Craine-Schrage Steel Co., Detroit.

Crescent Double Special
A fast finishing steel. Uses same as for Sanderson Double Special. Contains C 1.30, W 3.60. Crucible Steel Co. of America, New York.

Crescent Extra
Extra carbon tool steel, for twist drills, punches, reamers, shear blades, taps, woodworking knives. Carbon as desired. Crucible Steel Co. of America, New York.

Crescent Hot Work No. 2
A hot work steel, for pipe upset punches, bloom shears, etc. Contains C 0.95, Cr 3.75. Crucible Steel Co. of America, New York.

Crescent Rim Roll
Alloy tool steel, for rolls and drawing dies. Contains C 1.00, Cr 0.50. Crucible Steel Co. of America, New York.

Crescent Special
Special carbon tool steel, for cutters, forming tools, mandrels, knives, threading dies, tube drawing dies. Carbon as desired. Crucible Steel Co. of America, New York.

Crescent Tool
Standard tool steel, for blacksmiths' tools, boilermakers' tools, channeler tools, chisels, drills, hammers, picks, pins, planer tools, etc. Carbon as desired. Crucible Steel Co. of America, New York.

Creston
A special alloy steel. Amalgamated Steel Co., Cleveland.

Crocar
A special alloy steel, containing C and Cr. Vanadium-Alloys Steel Co., Latrobe, Pa.

Croloy
Air hardening steel for dies. Has maximum abrasion resistance. Contains C 1.50, Cr 12.00, V 1.00, Mo 0.80. Henry Disston & Sons, Inc., Philadelphia.

Croma
Water or oil hardening steel for heavy duty and highly stressed machine parts. Very tough and has high resistance to stresses. Contains C 0.35, Cr 1.00, Mn 0.80, Si 0.30. Lehigh Steel Co., New York.

Croman
A special alloy steel, containing Cr, Mn and Mo. Vanadium-Alloys Steel Co., Latrobe, Pa.

Cromo Tool Steel
Shock resisting steel, for chisels, etc. Contains C 0.50, Cr 1.10, Mo 0.50. Bissett Steel Co., Cleveland.

Cromovan
High production die steel, for long-run blanking and forming dies. Is air hardening and resistant to abrasion. Contains C 1.60, Cr 12.00, V 1.00, Mo 0.80. Firth-Sterling Steel Co., McKeesport, Pa.

Cronitung
A special alloy steel. Halcomb Steel Co., Syracuse, N. Y.

Crow
Carbon-chrome, water hardening steel, for drawing dies, forming rolls, etc. Has good shrinkage quality, and hardens deeper than carbon tool steel. Contains C 1.20, Cr 0.50, Mn 0.25. Allegheny Ludlum Steel Corp., Watervliet, N. Y.; also Edgecomb Steel Co., Philadephia.

Crown
Chrome-vanadium tool steel, for springs, bolts, gears, dies, pinions, etc. Contains C 0.50, Cr 1.00, Mn 0.80, V 0.20, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Crown-W
A special alloy steel, containing W. K. Engelsted, New York.

Crown W 20
A special alloy steel, containing W. Boyd-Wagner Co., Chicago.

Crusca Brands
Crusca New Process Hollow Drill (carbon steel), VJ Extra (special alloy), and VJ Special (special alloy). Crucible Steel Co. of America, New York.

CSM
A shock resisting chisel and punch steel. Halcomb Steel Co., Syracuse, N. Y.

CSM No. 2
Alloy tool steel, for zinc-base die casting dies. Contains C 0.30, Cr 0.80, Mn 0.75, Mo 0.30, Si 0.50. Crucible Steel Co. of America, New York.

C.T.V.—Hot Work
An oil hardening, red hard and tough steel, for bolt dies, hot extrusion dies, etc., containing C 0.40, Cr 3.50, W 2.50, V 0.50. William Jessop & Sons, Inc., New York.

Cyclops Brands
Cyclops Special, Extra, and Standard. Previously made by Cyclops Steel Co., now Universal-Cyclops Steel Co., Bridgeville, Pa.

C.Y.W.
Hot work steel, for hot forming bull dies and pressure dies. Has resistance to heavy pressure. Contains C 1.00, Cr 3.50, Mn 0.50. Firth-Sterling Steel Co., McKeesport, Pa.

D

Dacar
A regular carbon steel. Jessop Steel Co., Washington, Pa.

Damascus
Manganese - silicon oil hardening steel, for cold cutters, chisels, punches, stamps, shear blades, etc. Contains C 0.55, Cr 0.25, Mn, 0.90, V 0.20, Si 1.95. Latrobe Electric Steel Co., Latrobe, Pa.

Dannemora AD 95
A special alloy steel for coining dies, containing W, Cr and V. Ryer Incorporated, Ltd., Los Angeles.

Dannemora Best
A plain carbon steel. K. Engelsted, New York.

Dannemora Extra Best
A plain carbon steel. Adams & Osgood Steel Co., Boston.

Dannemora No. 0
A special alloy steel, containing W. Adams & Osgood Steel Co., Boston.

Dannemora Self Hardening
A special alloy steel, containing W. Adams & Osgod Steel Co., Boston.

Dannemora Very Best
A plain carbon steel. K. Engelsted, New York.

Darwin E-E
Water hardening steel, for finishing turning tools, shears, etc. Has fine grain. Contains C 1.35-1.50, Cr. 0.10-0.20, Mn 0.20, V 0.20-0.35, W 3.50-4.50, Si 0.15. Darwin & Milner, Inc., Cleveland.

Darwin 505 Special
Oil hardening, highest type high speed steel, containing C 0.65-0.70, Cr 4.00, Mn 0.30, Co 8.00, V 1.75, W 18.00, Mo 1.00, Si 0.35. Darwin & Milner, Inc., Cleveland.

Darwin-93
Oil-hardening steel, for hot work, containing C 0.30, Cr 3.50, Mn 0.30, V 0.30, W 10.00, Si 0.40. Darwin & Milner, Inc., Cleveland.

Darwin No. 1
Air-hardening, non-deforming steel, for dies and press tools. Contains C 1.50, Cr 13.00, Ni 0.40, Mn 0.40, V 0.25, Mo 0.75, Si 0.40. Darwin & Milner, Inc., Cleveland.

Darwin 1366
Oil hardening, highest type high speed steel, containing C 0.75, Cr 4.00, Mn 0.40, Co 13.00, V 2.00, W 18.00, Mo 0.50, Si 0.35. Darwin & Milner, Inc., Cleveland.

DBL
A tungsten-moly high speed, air or oil hardening steel, suitable for general shop use, and especially good for form tools, broaches, lathe and planer tools. Develops high hardness, holds keen edge, resists decarburization almost as well as 18-4-1. Contains C 0.80, Cr 4.00, V 1.50, W 5.25, Mo 4.00. Allegheny Ludlum Steel Corp., Watervliet, N. Y., also, Edgecomb Steel Co., Philadelphia.

Delaware Extra
Water hardening steel, for rock drills, general purposes, etc. Contains C 0.65-1.20, Mn 0.30, Si 0.20. Delaware Tool Steel Corp., East Wilmington, Del.

Delaware Standard
Water hardening steel for rock drills, general purposes, etc. Contains C 0.65-1.20, Mn 0.30, Si 0.20. Delaware Tool Steel Corp., East Wilmington, Del.

Delsteel Alloy
Water or oil hardening steel, for chisels, rivet sets, punches and dies. Has high toughness, hardness and fatigue resistance. Contains C 0.50, Mn 0.30, V 0.18, Mo 0.55, Si 0.75. Delaware Tool Steel Corp., East Wilmington, Del.

Denavis
A high speed steel, containing W and Cr. Denman & Davis, No. Bergen, N. J.

Deo
A plain carbon steel. H. Boker & Co., Inc., New York.

Deward
Manganese, oil hardening non-deforming steel, for blanking and forming punches and dies, machine cut plastic mold dies, etc. Good machinability and non-deforming quality. Contains C 0.90, Mn 1.50, Mo 0.30. Allegheny Ludlum Steel Corp., Watervliet, N. Y., also Edgecomb Steel Co., Philadelphia.

Diamond Alloy
Contains Co, Cr, W and Mo. Brown Alloy Works, Detroit.

Diamond A
An air hardening, abrasion and corrosion resisting die steel. Contains C 2.20, V 0.40, W 11.5. Midvale Co., Nicetown, Philadelphia.

Diamond Brand
An air hardening, abrasion and corrosion resisting die steel. Contains C 1.70, Cr 18.5. Midvale Co., Nicetown, Philadelphia, Pa.

Diamond M
A special carbon steel. Firth-Sterling Steel Co., McKeesport, Pa.

Diamond S
A regular carbon steel. Simonds Saw & Steel Co., Lockport, N. Y.

Diamonite
A cemented carbide steel. John A. Crowley Co., New York.

Dica B
A hot work steel for aluminum die casting. Contains C 0.33, Cr 4.80, Mn 0.40, W 1.15, Mo 1.15, Si 0.95. Jessop Steel Co., Washington, Pa.

Die Block
A plain carbon steel. Midvale Co., Philadelphia.

Die Block
A special alloy steel. Columbia Tool Steel Co., Chicago Heights, Ill.

Die Block C
A special alloy, containing Cr and W. Midvale Co., Philadelphia.

Die Casting
Hot work steel for die casting dies, containing C 0.40-0.50, Cr 2.40-2.65, Mn 0.50-0.70, V 0.20-0.30, Si 0.20-0.35. Braeburn Alloy Steel Corp., Braeburn, Pa.

Die L
High carbon, high chromium steel for stamping, trimming and punching dies, taps, etc. Is abrasion resistant. Contains C 1.40 to 1.60, Cr 11.00 to 13.00, Mn 0.20 to 0.40, V 0.20 min. Mo 0.70 to 0.90, Si 0.20 to 0.40. Heller Brothers Co., Newark.

Die Steel No. 13200
A special alloy steel. Simonds Saw & Steel Co., Lockport, N. Y.

Di-Mol
A molybdenum-tungsten high speed steel for metal cutting. Contains C 0.80, Cr 4.00, V 1.00, W 1.50, Mo 9.00. Henry Disston & Sons, Inc., Philadelphia.

D-9-Va.
Tap steel, for taps and reamers. Hard and tough. Contains C 1.15, Mn 0.60, V 0.20, Si 0.60. Henry Disston & Sons, Inc., Philadelphia.

DO-IT
A special alloy steel. Ziv Steel & Wire Co., Chicago.

Domestic
A plain carbon steel. Edgar T. Ward's Sons Co., Pittsburgh.

D 1
Steel for tools, having carbon content as ordered. Henry Disston & Sons, Inc., Philadelphia.

Double Extra Carbon
A special alloy steel, containing C and Cr. Midvale Co., Philadelphia.

Double L. C. T.
A special alloy hot work steel. Halcomb Steel Co., Syracuse, N. Y.

Double Seven
A non-deforming steel. Edgar Allen & Co., Ltd., Montreal, New York.

Double Six
A high chromium, high carbon type tool steel with excellent non-shrinking and non-warping properties. For blanking. drawing, mint, lamination, jewelry dies, gages, etc. Contains C 2.25, Cr 14.00, A. Milne & Co., New York; also, Edgar Allen Steel Co., New York.

Double Special
A special alloy steel. Crucible Steel Co. of America, New York.

Double Special
A special alloy steel. Firth-Sterling Steel Co., McKeesport, Pa.

Double Special
A special alloy steel. Halcomb Steel Co., Syracuse, N. Y.

Double Special
Fast finishing steel for drawing dies, fast finishing tools, brass turning. Has high hardness and holds keen edge. Contains C 1.30, Cr 0.50, Mn 0.25, W 3.25, Si 0.45. Columbia Tool Steel Co., Chicago Heights, Ill.

Double Special
A very hard, water-hardening steel, for burnishing tools. Contains C as desired, Cr 0.25, Mn 0.30, W 3.50, Si 0.45. Hawkridge Bros. Co., Boston.

Draco
Water-hardening steel, for all types of tools and dies of short life. Contains C as desired, Mn 0.25, V 0.20, Si 0.20. Universal-Cyclops Steel Co., Bridgeville, Pa.

Dreadnought
An 18-4-1 high speed steel, for tools, hack saw blades, etc. Contains C as desired, Cr 4.00, V 1.15, W 18.00. Hawkridge Bros. Co., Boston.

Dreadnought
A high speed steel, for boring tools, broaches, chasers, crowning tools, cutters, dies for forming glass, drills, file cutting chisels, gear cutters, hacksaw blades, hobs, etc. Contains Cr 4.00, V 1.00, W 18.00. Crucible Steel Co. of America, New York.

Drillalloy
Water or oil hardening steel, for rivet sets, punches and dies. Has high toughness, hardness and fatigue resistance. Contains C 0.50, Cr 0.75, Mn 0.80, Si 0.55. Delaware Tool Steel Corp., East Wilmington, Del.

Drill
A water-hardening drill steel, for shear blades, chisels, cold forming jaws for chuck and vise, punches for hot and cold cutting, axes, hammers, etc. Contains 0.80-0.90 C, about 0.50 Mn, about 0.25 Si, 0.025 P, and 0.030 S. Tennessee Coal, Iron & Railroad Co., Birmingham.

D-6-Co
High speed steel for metal cutting. Has maximum red hardness. Contains C 0.80, Cr, 4.00, Co 6.00 V 1.75, W 18.00. Henry Disston & Sons, Inc., Philadelphia.

D-29
A special alloy steel. Firth-Sterling Steel Co., McKeesport, Pa.

D-29
Chisel steel for pneumatic chisels and punches. Has high fatigue resistance. Contains C 0.55, Mn 0.80, Mo 0.50, Si 1.30. Henry Disston & Sons, Inc., Philadelphia.

Dualoy
A special alloy steel, containing W. Duke Steel Co., Inc., New York.

Dukane
Water hardening steel, for automatic screw machine production parts, dowel pins, mandrels, punches, plungers, roller bearings, shafts, small tools and dies. Contains C 0.95 to 1.05, Mn 0.20 to 0.40, Si 0.10 to 0.25. Pittsburgh Tool Steel Wire Co., Monaca, Pa.

Dukane Drill Rod
A plain carbon steel. Pittsburgh Tool Steel Wire Co., Monaca, Pa.

Duke-Kidd
A plain carbon steel. Duke Steel Co., Inc., New York.

Dukex
A special alloy steel, containing W. Duke Steel Co., Inc., New York.

Durabil
A plain carbon steel. Duke Steel Co., Inc., New York.

Duranium
A high speed steel, containing U. Duke Steel Co., Inc., New York.

Duredge
A tough chisel steel. Contains C 0.55, Mo 0.40. Midvale Co., Nicetown, Philadelphia.

Durite
A tungsten hot work steel. Columbia Tool Steel Co., Chicago.

Duro
A special alloy steel. William Jessop & Sons, Inc., New York.

Durodi
A special alloy steel, containing Cr, Ni and Mo. A. Finkl & Sons Co., Chicago.

Dutrax
A plain carbon steel. Duke Steel Co., Inc., New York.

Duvan
A special alloy steel, containing Co. Duke Steel Co., Inc., New York.

Dy Cast No. 1
Air hardening die steel, for die casting dies for aluminum and white metals. Has low distortion, and resists heat checking. Contains C 0.35, Cr 5.25, Mn 0.30, V 0.50, Mo 0.80, Si 1.00. Latrobe Electric Steel Co., Latrobe, Pa.

D. Y. O.
Tungsten hot work steel, for hot work dies. Has red hardness and toughness. Contains C 0.30, Cr 4.00, Mn 0.30, V 0.50, W 14.50, Si 0.25. Carpenter Steel Co., Reading, Pa.

E

EB Alloy
General purpose, chrome, hot-work, air or oil hardening steel, for hot header and gripper dies on bolts and rivets, shear blades, trimmer dies, etc. Good resistance to abrasion and heat and less expensive than tungsten, hot work steels. Contains C 0.65, Cr 3.75, V 0.55, Mo 0.70. Allegheny Ludlum Steel Corp., Watervliet, N. Y. also, Edgecomb Steel Co., Philadelphia.

E. H. W. No. 1
General Hot work tungsten steel. Used where extreme toughness is essential; hot heading dies, etc. Contains C 0.25, Cr 4.00, Mn 0.25, V 0.50, W 15.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

No. 883
Chromium hot work steel for hot work dies, punches, mandrils. Has red hardness and toughness. Contains C 0.40, Cr 5.00, Mn 0.35, V 0.40, Mo 1.35, Si 1.10. Carpenter Steel Co., eading, Pa.

89 MC
A special alloy steel. Jessop Steel Co., Washington, Pa.

812 Die
Non-deforming steel for dies and knives. Resistant to abrasion. Contains C 1.80, Cr 12.25. Henry Disston & Sons, Inc., Philadelphia, Pa.

812 Die Steel
A special alloy steel. Henry Disston & Sons, Inc., Philadelphia.

E. I. S. 14
Water hardening steel, for heavy duty metal shearing, containing C 0.75, V 0.15. Heppenstall Co., Pittsburgh.

E. I. S. 15
Water hardening steel, for heavy duty metal shearing, containing C 0.90, V 0.15. Heppenstall Co., Pittsburgh.

E. I. S. 41
Oil or air hardening steel, for hot work dies, containing C 1.00, Cr 4.00, V 0.15, Mo 0.25. Heppenstall Co., Pittsburgh.

E. I. S. 43
Air hardening steels, for shear blades, containing C 1.50, Cr 12.00. Heppenstall Co., Pittsburgh.

E. I. S. 45
Oil or air hardening steel for shear blades, containing C 0.80, Cr 12.00. Heppenstall Co., Pittsburgh.

E. I. S. 51
Oil hardening, cold or hot trimmer steel, containing C 0.60, Cr 0.80, Ni 1.50, V 0. 15, W 2.00. Heppenstall Co., Pittsburgh.

E. I. S. 57
Oil or air hardening hot work die steel, containing C 0.60, Cr 1.00, Ni 2.00. V 0.12, Mo 0.80. Heppenstall Co., Pittsburgh.

E. I. S. 73
Oil or air hardening hot work die steel, containing C 0.30, Cr 3.50, V 0.35, W 10.00. Heppenstall Co., Pittsburgh.

E. I. S. 76
Oil hardening non-deforming die steel, containing C 1.00, Cr 0.60, Mn 1.20, V 0.10, W 0.50. Heppenstall Co., Pittsburgh.

E. I. S. 79
Oil hardening hot work die steel, containing C 0.40, Cr 5.00, V 0.50, W 4.25, Mo 0.40. Heppenstall Co., Pittsburgh.

E. I. S. 97
Oil hardening hot work die steel, containing C 0.50, Cr 0.40, Mn 1.00, Mo 0.40, Si 2.00. Heppenstall Co., Pittsburgh.

Elastuf Type A
A special alloy steel, containing Cr and V. Horace T. Potts Co., Philadelphia.

Electrex
Water hardening carbon tool steel, for brake dies, machine parts, etc. Has high tensile strength. Is available in several carbon ranges. Contains Mn 0.35, Si 0.25. Columbia Tool Steel Co., Chicago Heights, Ill.

Electric Brand
Hard and tough water-hardening tool steel. Contains C 0.80 to 1.10, Mn 0.40 max., Si 0.10 to 0.20. Heller Brothers Co., Newark.

Electric Cobalt
Cobalt high speed steel, for roll turner tools, shear blades, etc. Has high red hardness. Contains C 0.70, Cr. 4.25, Mn 0.25, Co 5.00, V 1.10, W 18.50, Mo 0.70, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite Double Six
Molybdenum-tungsten high speed steel, for counter sinks, and counter bores. Contains C 0.85, Cr 4.00, Mn 0.25, V 1.50, W 5.75, Mo 5.50, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite Lacomo
Molybdenum - tungsten - cobalt high speed steel, for hobs, inserted saw teeth, lathe centers, etc. Has high red hardness. Contains C 0.80, Cr 4.00, Mn 0.25, Co 5.00, V 1.25, W 2.00, Mo 8.50, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite No. 1
Tungsten high speed steel, for automatic machine tools, blanking punches, etc. Contains C 0.70, Cr 4.25, Mn 0.25, V 1.00, W 18.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite No. 19
Tungsten, high vanadium, high speed steel for blanking and boring tools. Has high abrasion resistance. Contains C 0.84, Cr 4.20, Mn 0.25, V 2.10, W 18.50, Mo 0.60, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite Super Cobalt
Cobalt high speed steel, for slotting cutters, taps and dies, thread chasers, etc. Has high red hardness. Contains C 0.85, Cr 4.25, Mn 0.25, Co 9.00, V 1.80, W 18.50, Mo 0.80, Si 0.30. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite Super Como
Molybdenum - tungsten - cobalt-high speed steel, for lathe tools, milling cutter teeth, milling cutters, etc. Has high red hardness. Contains C 0.80, Cr 3.75, Mn 0.25, Co 7.50, V 1.10, W 1.75, Mo 8.50, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite Tatmo
Molybdenum-tungsten high speed steel, for cutting-off tools and file cutting chisels. Contains C 0.80, Cr 3.75, Mn 0.25, V 1.00, W 1.75, Mo 8.00, Si 0.30. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite T. N. W.
Molybdenum high speed steel, for form and gear cutters. Contains C 0.85, Cr 4.00, Mn 0.25, V 1.80, Mo 8.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite U (ranium)
Tungsten high speed steel, for paper knives and planer tools. Has high red hardness. Contains C 0.75, Cr 4.25, Mn 0.25, V 1.60, W 14.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite U B
Cobalt high speed steel, for reamers, and reamer blades. Has high red hardness. Contains C 0.80, Cr 4.25, Mn 0.25, Co 4.25, V 2.15, W 14.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite Ultra Cobalt
Cobalt high speed steel, for tire turning tools, twist drills, wood cutting knives. Has high red hardness. Contains C 0.85, Cr 4.25, Mn 0.25, Co 12.00, V 1.80, W 18.50, Mo 0.80, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Electrite Vanadium
Tungsten, high speed high carbon, high vanadium steel, for broaches and burnishing tools. Has very high abrasion resistance. Contains C 1.00, Cr 4.00, Mn 0.25, V 3.00, W 18.00, Mo 0.80, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

11 A 45
Water hardening grain controlled steel, containing C 0.40. Heppenstall Co., 4622 Hatfield St., Pittsburgh.

No. 11 Comet
"Standard Grade" water hardening tool steel, for general tool room use. Has hardness, wear resistance, fatigue resistance. Containing C 1.05, Mn 0.20, Si 0.20. Carpenter Steel Co., Reading, Pa.

No. 11 Extra
"Extra grade" water-hardening tool steel for general tool room use. Hardness, wear-resistance, fatigue resistance. Contains C 1.05, Mn 0.20, Si 0.20. Carpenter Steel Co., Reading, Pa.

No. 11 Special
"Special grade" water-hardening tool steel for general tool room use. Has hardness, wear resistance, fatigue resistance. Contains C 105, Mn 0.20, Si 0.20. Carpenter Steel Co., Reading, Pa.

No. 11 Titan
Electric melted water hardening tool steel for inexpensive tools. Contains C 1.05, Mn 0.20, Si 0.20. Carpenter Steel Co., Reading, Pa.

Eltun
Hot work steel. Has strength at elevated temperatures. Contains C 0.45, Cr 3.00, V 0.25, W 9.00. Henry Disston & Sons, Inc., Philadelphia, Pa.

Epco-Oil Hard
For general tool and die purposes when no distortion is desired. Used for blanking and forming dies, master tools, gages, etc. Contains C 1.00. Cr 0.50, Mn 1.00, W 0.50, Si 0.35, P under 0.025, S under 0.025, Wo 0.50. Williamson Brothers, Inc., Bridgeport, Conn.

Epco-Water Hard
General purpose tool steel, for blanking, forming and trimming dies, gages, etc. Contains C 1.00-1.10, Mn 0.25, Si 0.20, P under 0.025, S under 0.025. Williamson Brothers, Inc., Bridgeport, Conn.

E. S. A.
Oil hardening, finishing steel, for burnishing tools, counter bores, drawing dies, finishing cutters, spinning tools. Contains C 1.40, Cr 0.15, Mn 0.25, V 0.15, W 4.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

E. No. 25
A water hardening steel, used for moil points to break up concrete asphalt and hard dirt roads. Contains C 1.00, Mn 0.37, V 0.25, Si 0.25. Jessop Steel Co., Washington, Pa.

Eureka
A plain carbon steel. Columbia Tool Steel Co., Chicago Heights, Ill.

E. V. M.
A high speed steel of the 18-4-2 type. Vanadium-Alloys Steel Co., Latrobe, Pa.

E. V. S.
A special alloy die steel, containing W and Cr. Latrobe Electric Steel Co., Latrobe, Pa.

Excelo
Hot work steel, for hot work dies, punches, shearblades, etc. Has toughness, red hardness, fatigue resistance. Contains C 0.55, Cr 1.50, Mn 0.40, V 0.35, W 2.50, Si 0.30. Carpenter Steel Co., Reading, Pa.

Exl-Die
Non-deforming, oil hardening steel for blanking dies, broaches for nonferrous metals, hubs, stamping dies, thread gages. Good resistance to abrasion. Contains C 0.90, Cr 0.50, Mn 1.15, W 0.50, Si 0.35. Columbia Tool Steel Co., Chicago Heights, Ill.

Extra
A plain carbon steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

Extra
A plain carbon steel. Firth-Sterling Steel Co., McKeesport, Pa.

Extra
A plain carbon steel. Carpenter Steel Co., Reading, Pa.

Extra
Water hardening steel for tools and dies. Contains C as ordered. Henry Disston & Sons, Inc., Philadelphia, Pa.

Extra
Water hardening carbon tool steel, for shear blades, punches, rivet sets, cold heading dies, lathe centers, hot trimming dies. Is hard with tough center, wear resistant. Available in several carbon ranges. Contains Mn 0.25, Si 0.25. Columbia Tool Steel Co., Chicago Heights, Ill.

(TO BE CONTINUED NEXT WEEK)

Protect vulnerable floors!

When you give factory and warehouse floors the rugged protection of "A. W." Rolled Steel Floor Plate, you make a long-term investment in good plant management. Steady traffic, heavy loads, toughest wear will not damage or impair it. There are no worn and slippery surfaces to endanger men on foot. No cracks or ridges to upset floor trucks. Oil-proof, heat-proof, fire-proof, crack-proof. Easy to clean, quick to drain. Made in five patterns. The Super-Diamond Pattern is shown here. Write for folder.

"A. W." *Rolled Steel* FLOOR PLATE

ALAN WOOD STEEL CO., CONSHOHOCKEN, PA.
District Offices and Representatives—Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, New Orleans, Pittsburgh, Roanoke, Sanford, N.C., St. Paul, St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Labor troubles again a disturbing factor in automobile industry . . . Wage increases the principal cause of agitation, but closed shop issue is also in forefront . . . Much work is being held up on defense projects . . . Chevrolet to make airplane engines.

DETROIT — While the automobile industry awaits the results of an NLRB poll of Ford workers on union recognition — which, on the face of it, would indicate some sense of responsibility — current events offer little basis for faith in any of the unions' promises or commitments.

In virtually every important defense project in this area the unions, both CIO and AFL, have deliberately stuck pickets' clubs through the spokes and stopped the turning wheels of industry. Some flagrant indications of lack of responsibility are being given, and there is every reason to believe that the union leaders are coldly seeking their objective of a closed shop and "10 cents worth of inflation" with utter disregard for effects on the defense program.

The closed shop issue has for long been the aim of a certain group of unionists, although it is by no means the unanimous goal of union officials, nor is it the choice of members. For months it has been clear that the next major move of the UAW would be to win what it calls a union shop, in reality a closed shop. One of the city's most important executives has gone so far—and you won't read this in the newspapers—as to propose to fellow industrialists that the penalty of the UAW's own sins should be visited on the union by giving in to the demand. In justification of such a proposal he pleads the cause of production, especially production for defense, and points out his belief that all of the penalties, costs, loss of freedom in job-seeking and other disadvantages will be visited entirely upon the union membership.

In inner circles the proposal has stirred a furore that is answered with this argument: "Management will not, or cannot, without risking strikes and violence, fight for the right of any specific individual to refuse to join a union in its plant; why should it therefore suffer this current wave of labor trouble in any broad-gaged attempt to keep the closed shop from closing around a mass of employees?"

Wage Increase Principal Goal

The argument may be specious in its assumption that ALL the costs of a closed shop are borne by the union members; in fact, it seems a certainty that such costs would spread in widening circles to affect everyone in our economy—but this is no dissertation on the subject, it is merely a frank report of an argument which is rocking industry here today.

Certainly the first to "give in" would be labeled forever, but some contracts already signed in Detroit (and in existence for several years) have given "back-door recognition" to the union shop, or to some subterfuge. The term union shop has not found universal acceptance, but don't be surprised to see a new word invented.

Just as the closed shop is the goal of union leadership, a general 10c. per hr. rise in wages is the goal of a large number of union members. Obviously they have been propagandized, and word from above seems to have been "get yours now," with more than occasional references in union circles to a ceiling on wages and prices to come after the general 10c. per hr. has been attained.

It appears that this may be the shape and form of controlled inflation, or at least an attempt at it.

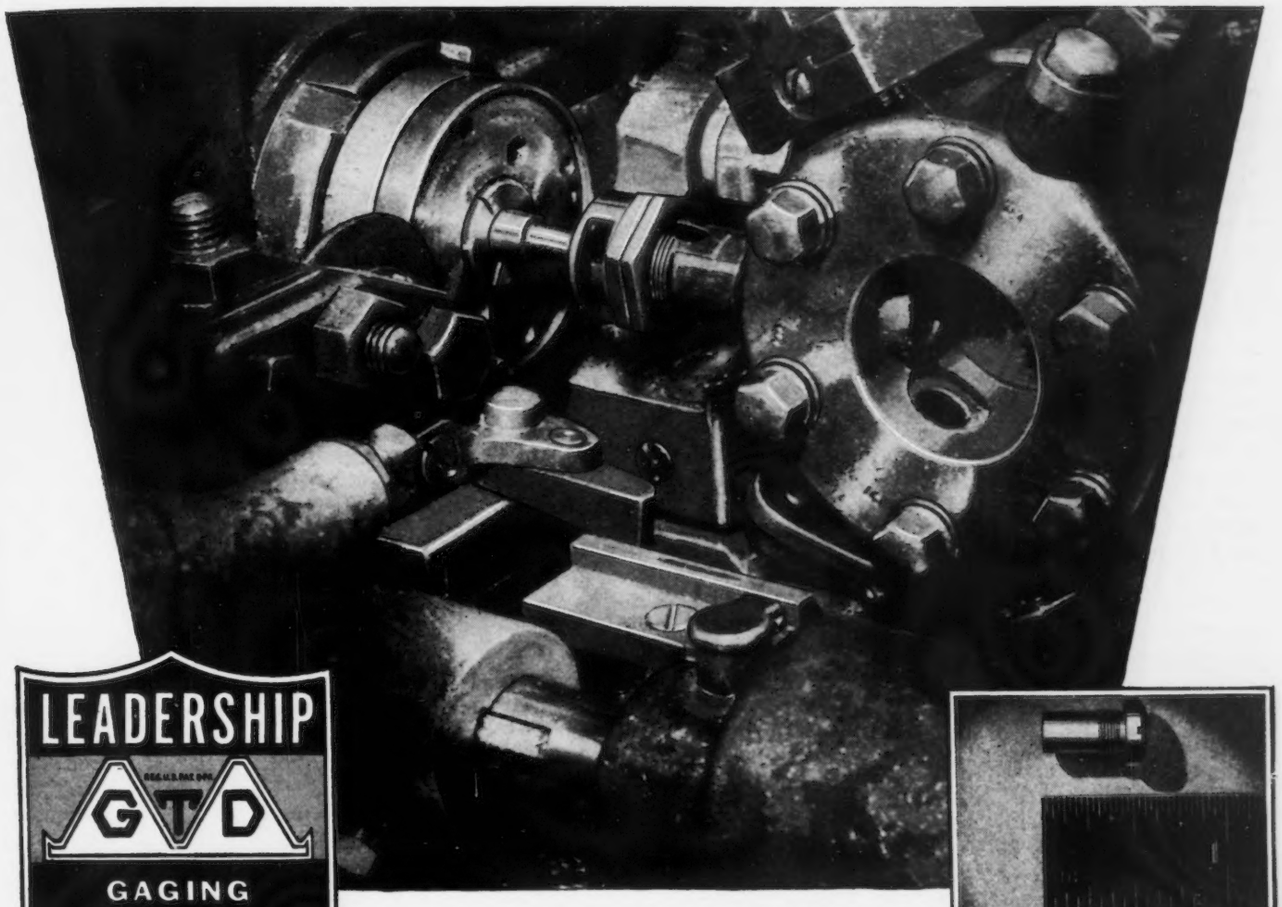
This production-minded town is more interested, however, in finding a quick cure to the senseless halt in armament output.

It sees Packard with only 300 machine bases completed in its Rolls-Royce plant and 300 holes dug in the floor waiting for concrete to be poured—but held up by an AFL truckers' strike that has precipitated a general building trades strike in Detroit. And Ex-Cell-O Corp., 85 per cent of its production devoted entirely to defense through the construction of machine tools and the manufacture of airplane parts, strikebound by workers who turned down the settlement reached by their own negotiating committee, forced the issue before the National Defense Mediation Board, and sent the strike into the second half of May still unsettled. Biggest of all is the GM-UAW strike, which was launched last Thursday by walkouts throughout Flint GM plants. If these had spread through all GM factories 165,000 or more workers, including eventually all those engaged in defense work, would have been put out of work.

Construction Projects

The list of strikes grew rapidly last week but the fundamental issues in all were the same. Most widespread in its effects, as indicated above, was the truck strike and building strike.

One important reason for this general effect is the fact that Detroit has come to rely largely on transit-mixed concrete. In all the idle construction projects inability to obtain delivery of this or some other materials caused the delay. Some plants were able to get materials by sending their own trucks and crews, always at the risk of provoking a riot, and in at least one case a couple of automotive engineers supervised the mixing of concrete for a special installation that was urgently required.



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GAGING
THREADING
DRILLING

These screws are turned out at the rate of 375 per hour. The Die is a ¼"-56 High Speed Steel "*Acorn*" Die, running at 2000 R.P.M.

"Pretty Good" Isn't Enough

INSTRUMENT makers know the vital need for accuracy—and that under today's pressure they can't rely on older and slower methods of production. So, on threading jobs they are turning to "*Acorn*" Dies.

Any manufacturer whose operations call for fast, super-accurate threading can get ideas from the job shown here. "*Acorn*" Dies, backed as they are by twenty-odd years of unremitting study will show the way to any other thread cutting tools or methods when the requirements include *all* these things—speed, accuracy, clean threads, long tool life. "*Acorn*" Dies are one of the well-known products which have been developed by "*Greenfield*" research and leadership.

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GTD GREENFIELD

TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

In the lee of the storm, plans went ahead for the automobile industry to take on still more defense work. Since last week's mention in this column of Chevrolet's possible undertaking of an airplane engine program, it has been learned that the company will clear out all of its automobile work from the Buffalo assembly plant and the Tonawanda engine and axle plant. A contract is expected to be signed some time this week for the manufacture of one of the large air-cooled engines, apparently the Pratt & Whitney. The Tonawanda plant was started in March, 1937, and was, on a different scale, a modern duplication of Chevrolet's engine producing facilities at Flint and its axle plant in Detroit. It covered nearly 1,000,000 sq. ft. and was originally tooled up to produce 1200 engines a day and 1200 axles.

Peak Production Next Year

Latest report on the engine program at Packard is that the first hand-built model has been completed and operated. It was "motored" first on the dynamometer, given a short run under its own power and then disassembled for thorough inspection. Despite the fact that this engine design had been converted from metric dimensions, Packard's engineers have done such a workmanlike job that every part and every sub-assembly unit went together perfectly without any hand-fitting. The second pilot engine is expected to be finished this week. However, Packard officials emphasize that they are not in production and will not be until next fall, with peak production not expected to be attained until after the first of the year.

The extent of Packard preparations for the production of the Rolls-Royce Merlin engine is indicated by plans recently discussed for Army inspection of the power plants. Unused to mass production methods, inspectors were amazed to find that they would be limited to 24 minutes' inspection time because they must inspect it on a moving assembly line, as in automotive production. This, by the way, is illustrative of a principal of mass production frequently overlooked; the conveyor chain is merely the mainspring that times mass production operations. It is not the soul of the mass production system.

Aluminum Forgings By Chrysler

Apparently after months of dilly-dallying, the bottleneck in aluminum forging for aircraft is being broken. Chrysler has been given a Defense Plant Corp. appropriation of $750,000 to permit it to produce aluminum forgings. Behind this is a long story of experimentation fostered by K. T. Keller, president of Chrysler, who has been determined to demonstrate that the auto industry can pierce the veils of secrecy that have hung over the aluminum forging art. Chrysler will produce aluminum forgings for use in the Martin Bomber subassemblies, which it will build, and also will supply all other aluminum forgings required by Martin. Another source of aluminum forgings is expected to be opened up by Willys-Overland, which has received a federal loan of $2,172,000 for remodeling its steel forge plant. Of the total, $2,070,000 will be spent for new equipment.

Strikes Cause Output Drop

The walkout in General Motors plants in Flint, Mich., and a strike at Hudson Motor Car Co. caused automobile production to drop last week to 127,255 units compared with 132,380 in the previous week, and 99,030 in the corresponding week of last year, according to Ward's Reports Inc. The industry trend had been upward and it is expected that last week's production would exceed that of the previous week by at least several hundred.

* * *

Defense Plant Corp. to Buy $200 Millions of Machine Tools

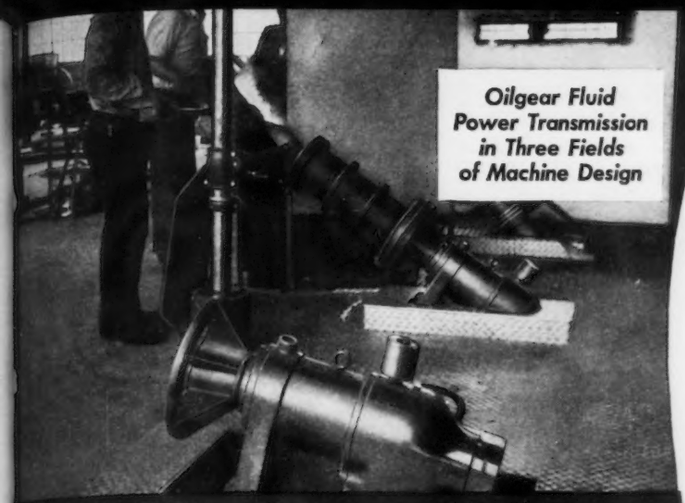
Washington

• • • **The Defense Plant Corp.,** RFC subsidiary, will buy an additional $200,000,000 worth of machine tools for lease or sale to plants. This announcement was made last week by Federal Loan Administrator Jesse H. Jones. The purchase will be made, he said, at the request of OPM Director General William S. Knudsen, in order to provide a backlog for the machine tool industry and to give it an idea of what plans it must make. Manufacturers, he said, are hesitant about expansion for the problematical future.

Mr. Jones also announced that the 170,000-lb. of aluminum to be bought from the Aluminum Co. of Canada, Ltd., might be considered part of the additional American purchases in Canada.

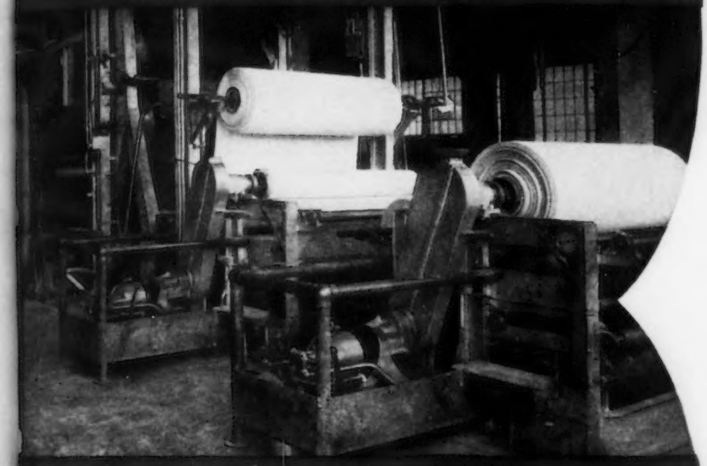
The Senate last week voted the RFC an increase of $1,500,000,000 in lending authority together with greatly broadened powers to finance defense production.

MOSQUITO BOATS WITH A STING: These small Navy craft, capable of speeds up to 60 m.p.h. and armed with four torpedo tubes and anti-aircraft guns, were exhibited before visiting Latin American Naval officers last week.

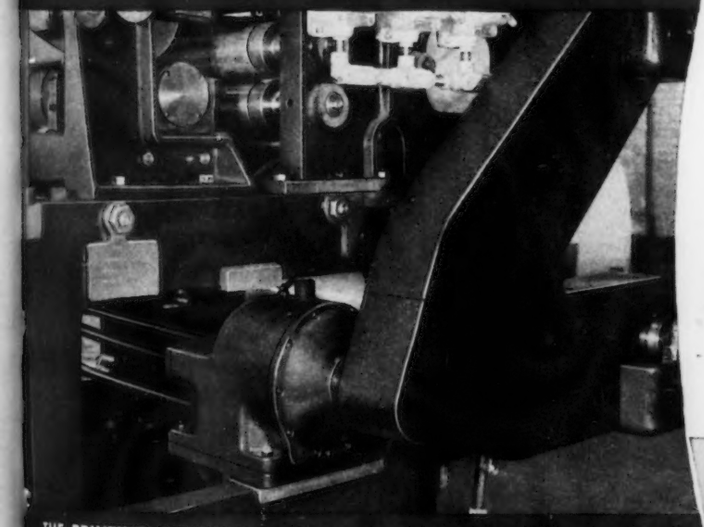


Oilgear Fluid Power Transmission in Three Fields of Machine Design

CENTRIFUGAL CASTING . . . The various metals and alloys used in this newly practical method of "liquid forging" demands super-ability to control speeds synchronously or independently. A leading manufacturer in this field has chosen Oilgear Fluid Power Transmission because it permits him this independent control with infinite speed variation, convenience, the cushioning effect of Oilgear Fluid Power against shock, and the elimination of high speed gearing. He points to the successful operation of Oilgear as demonstrated by 18 months' flawless performance!



RUBBER TIRE MAKING . . . A skim coat rubber calender demands not only the utmost in control of power and speed, but an ability to synchronize winder rolls smoothly and perfectly. For this difficult application, Oilgear Fluid Power Transmission was chosen. • In three years of operation only minor adjustments have been necessary. *And Oilgear enables the user to maintain a much higher quality of uniform production with far fewer rejects.* Oilgear "tension control" adds quality to rubber tires.



THE PRINTING INDUSTRY . . . Oilgear controlled variable speed drives on roll-fed multi-color cellophane presses (as well as large newspaper color presses) have reduced stock scrappage to one-tenth that of ordinary drives. Controlled, exceptionally slow speed during the register and adjustment period, smooth acceleration and deceleration without disturbing register, and instantaneous hydraulic braking result in extra printing profits. Low installation, power and labor cost and negligible maintenance provide additional savings.

HOW TO SOLVE THE

Pressing Drive Problems

of Modern Machine Design

Designers today are attempting to incorporate into their drives many functions thought impossible a decade ago. It is not too much to say that success or failure depends almost entirely on the type of power transmission used.

There is one type of power transmission available today that presents an unusual record of success. It has helped designers achieve unbelievable flexibility, versatility and sensitiveness of control . . . as to speed, energy, acceleration and deceleration, timing and sequence of movements.

That type of transmission is Oilgear Fluid Power Transmission. You are invited to reject all your previous ideas as to what hydraulic transmission can accomplish . . . and let us send you case histories showing what Oilgear has accomplished, either in your own field or in a related field. Don't wait, but send now for this vital information. Also send coupon for descriptive Bulletin 60000. There is no obligation on your part. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee, Wisconsin.

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Washington

BY L. W. MOFFETT
Washington Editor

• Strong public support eases way for early enactment of price control legislation . . . Henderson seen on sound ground in hammering at perils of inflation . . . History shows headaches come with price restraints.

WASHINGTON — New price control legislation is in the offing. The chances are strong that its enactment will not be difficult. That is because it will have widespread public support. The public, as well as industry as a whole, is aware of the dangers of inflation if there is no control of the price structure during a period of emergency. It is realized that Leon Henderson, head of the Office of Price Administration and Civilian Supply, is on sound ground in hammering away at the perils of inflation and in insisting that the chief preventive lies in price control, with certain brands of taxation as an auxiliary.

Though OPACS definitely has no present authority either to fix prices or to enforce orders establishing them, they are effective for two principal reasons: Public support and support of affected industries. Unquestionably there are some in these industries who dislike the prices and regulations governing. At the same time, the necessity of price control under emergency conditions is recognized. Therefore, even if it is felt that there are inequities, they are accepted without legal challenge. This is due in large measure to the fair attitude pursued by OPACS. In some cases it has frozen ceiling prices without giving an industry advance notice of its contemplated action and consequently without giving it or segments of it an opportunity to protest. That was done in the case of steel, though whether protests would have been made had the opportunity presented itself is not known. Mr. Henderson has sought to justify his quick action on steel prices on the claim that because of the 10c. an hour wage increase the industry was about to announce price increases, though there was no official indication that such action was contemplated, justified as most steel executives believe it was and is.

OPACS Openminded On Profits

But in all cases the OPACS has been open-minded and stood ready upon satisfactory evidence to modify findings in order to permit reasonable profits. Soon after the steel order was issued, a small company was allowed to maintain prices it had been quoting which are higher than the frozen levels, and requests from other small companies to charge prices above the fixed scale have been taken under consideration. The general scale itself is being maintained during a test period, after which it will be subject to upward adjustment should OPACS feel that evidence warrants such action.

Price control now is being done on the installment plan and largely has been applied to raw materials. Steel prices were frozen because they are rated as a bellwether of the economic structure. Where they move, so economists claim, other durable goods prices follow. It was on this basis that OPACS froze prices of farm implements. Manufacturers of agricultural machinery were told that since their steel will cost them no more, there was no reason for them to increase their prices.

With these price controls established OPACS is preparing to get statutory authority for overall price regulation, confident it will have public support without which even legislation itself would be of little value. And even with both public support and legislation OPACS is aware that it will have many headaches and probably find efforts to control prices in some fields will be futile unless it has a happy experience that runs counter to all history. For this reason OPACS is hoping to escape the task of attempting control of retail prices by legislation, even in the doubtful event that such legislation were constitutional. In this field price restraint is especially dependent upon public opinion, and only too often it has been inadequate.

Would Empower OPACS to Get Facts

One chief purpose of price control legislation is to authorize OPACS to compel disclosures of books, or other documents that may be necessary to get at facts; to conduct hearings, and to issue subpoenas, backed by power of injunction, and penalties for violations. This is government regimentation of the strictest kind. But this also is a period of emergency, and drastic regulation for the sake of the national defense readily is given public support. There are present laws that provide indirect but stern means of controlling prices, but the Administration has had no reason as yet to exercise them. Presumably it would be loath to resort to such powers. They are the powers authorized in Section 9 of the Selective Service Act of 1940, which, somewhat broadened, is a reenactment of Section 120 of the National Defense Act of 1916, giving powers to the War Industries Board.

They provide a means for the Army and Navy to take over plants and obtain defense supplies at prices they can fix at the direction of the President in the event of reprisal of a manufacturer to accept defense orders.

OPM Director General William S. Knudsen last week announced the creation of the Materiel Coordinating Committee—United States and Canada to cooperate in the exchange between the two countries of

Help keep your drills

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EMULSIFYING

CUTTING OIL

PERFORMANCE DATA

OPERATION—Drilling a 3½" hole in the solid.

MACHINE—"AMERICAN" 5' 15" Column Hole Wizard Radial Drill.

MATERIAL—S. A. E. 1020 Cast Steel.

SPINDLE SPEED—83 R. P. M.

FEED—.018 inch.

CUTTING LUBRICANT—1 part Sunoco to 20 parts water.

Courtesy of THE AMERICAN TOOL WORKS CO.

SMOOTH ROUND HOLES WITH SPEED AND ACCURACY

PRODUCTION and still greater production . . . that's the order of the day. And, to meet this demand, drills must cut fast . . . cut clean . . . and hold their edges—they must *keep pointed for production!*

That's why leaders of the machine tool industry choose, use and recommend SUNOCO Emulsifying Cutting Oil for their machines. They know its high heat absorbing and lubricating qualities aid drills in cutting true cylindrical holes —with *speed* and *accuracy*. They know that—with SUNOCO—drills clear easily, do not clog, bind, chatter or burn . . . and "down time" for regrinds can be reduced.

Keep a step *ahead* of production demands with the correct cutting lubricant —use SUNOCO. Test it in your own plant—let the results prove its merits.

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SUN OILS

PETROLEUM PRODUCTS FOR ALL INDUSTRIES

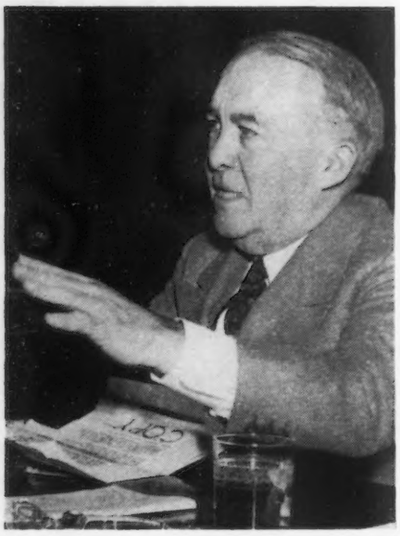

Photo by Harris & Ewing

10-CENT ALUMINUM: Richard S. Reynolds, above, president of the Reynolds Metals Co., told a Senate committee he expects to produce aluminum at 10c. a pound (against the current price of 17c.-18c. a pound) when the company's new plants are in full operation.

[CONTINUED FROM PAGE 74]

vital information on their supplies of strategic materials.

Representing the United States on the committee are OPM Director of Priorities E. R. Stettinius, Jr., and OPM Deputy Director of Production William L. Batt. They were nominated by Mr. Knudsen. Canadian representatives, members of the Canadian Wartime Industry Control Board, are G. C. Bateman and H. J. Symington, who were nominated by C. D. Home, Canadian Minister of Munitions and Supply.

Creation of the committee followed a number of conferences and discussions of the need for such an agency and the mutual advantages to be gained by the free exchange of information on raw material supplies available in each nation.

↓ ↓

• • • **The Treasury Department's** Procurement Division, which is currently expanding its specifications division because of the defense program, has prepared and issued emergency alternate specifications for laundry machinery and ash and garbage cans. In the one case, the use of aluminum was deleted from the specifications. On the cans, specifications calling for galvanized cans were changed to call for enamel cans.

There may be other emergency specifications issued for as many as 100 different products purchased by the government where the requirements previously called for the use of zinc, aluminum, nickel, chromium, etc. The procurement division is working closely with OPM, the Army and Navy on the problem.

Photo by Harris & Ewing

NO COOLING OFF: While William H. Davis, above, vice-chairman, National Mediation Board, told the Senate Education and Labor Committee that a bill forcing labor to go through a cooling-off period before striking was the best of its type he had seen, he still felt it unnecessary. "I am against any form of compulsion in labor mediation," he said. Meanwhile industry and the public wondered when the epidemic of strikes and threatened walkouts in defense plants would end.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Write Today!

TOOL MAKERS DIE MAKERS!

Send for the Blanchard Catalog No. 11 Today

THE No. 11 Blanchard Surface Grinder was designed especially for lowering the cost of grinding dies, jigs, fixtures and small parts—with finish, accuracy, and speed to satisfy modern production requirements.

Tool makers—die makers—don't miss this opportunity to get information on the machine that was designed as you would have it—for your own requirements! Send the Coupon today!

Without obligation, please send me my copy of the No. 11 Blanchard Surface Grinder Catalog.

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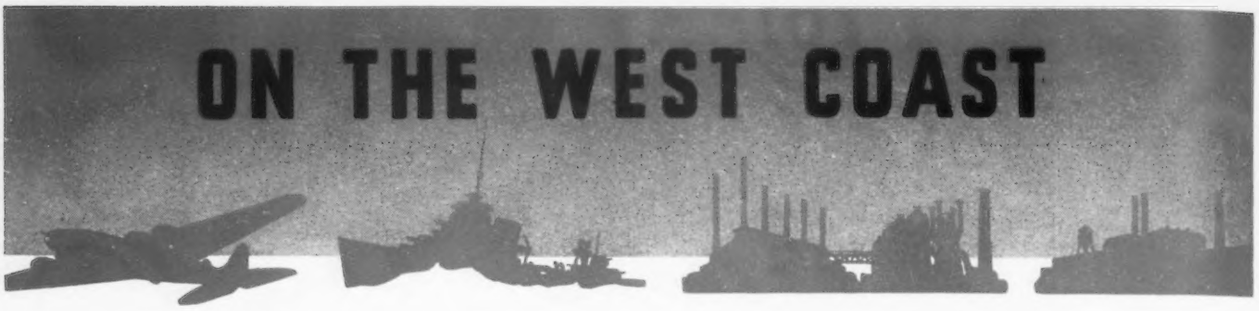
BLANCHARD MACHINE CO., 64 State St., Cambridge, Mass.

ON THE WEST COAST



LABOR demands for higher wages and better working conditions are only the preliminary rounds in a battle for increasing union voice in management and determination of industry practices, believes Almon E. Roth, the man who organized San Francisco and Pacific Coast waterfront employers to meet organized port workers.

In his speech before the American Steel Warehouse Association at San Francisco, Mr. Roth indicated that San Francisco warehouse unions were making a bid for personnel and operative policy determination in negotiations for their new contract to take effect next month.

Dave Beck, Seattle labor lord, has always maintained that labor should have a loud voice in determining trade practices, and in many cases he has backed up working agreements with price policing.

Office workers are the next great field in which unionization efforts will be pushed on the Coast, Mr. Roth believes. All past efforts to unionize this group, even in such labor union strongholds as San Francisco and Seattle, have made little headway. The last big push to sell unionization to white collar workers in the San Francisco region was in 1937 and 1938. Few union converts were made at that time. Now, both the teamsters, largely AFL, and the warehousemen, a CIO group in most cities, are planning to intensify their efforts to bring office workers into their respective organizations.

California employers have been cheered, however, by the passage by lopsided votes in the state senate and assembly of the "hot cargo" bill which would forbid secondary boycotts. Although great doubt exists as to whether long-haired Governor Culbert Olson will sign the measure, a fair chance exists to over-ride a possible veto by a two-thirds majority in the legislature.

The shipyard machinists' strike, which closed all major shipbuilding and ship repair yards in the San Francisco Bay area, with one exception, brought home strongly the necessity of plugging up all the holes in labor agreements before trying to make them hold water. Less than a month ago an agreement was concluded by representatives of all major Pacific Coast shipbuilders with the exception of Bethlehem, with the AFL Metal Trades Councils of all Coast cities setting up a wage scale for Coast shipyard workers and including a key clause forbidding strikes and lockouts.

• Warehouse Association meeting on Coast told labor demand for higher wages is only preliminary round in attempts to give unions place in management . . . Secondary boycotts are forbidden in California legislature's "hot cargo" bill.

The CIO had observers at meetings of the Shipbuilding Stabilization Conference which led up to the agreement. H. A. Farmer, member of the general executive board of the Industrial Union of Marine and Shipbuilding Workers of America (CIO) enthusiastically endorsed the agreement before reporters and said, "The CIO is going right down the line with this conference in its attempt to prevent strikes and lockouts in the shipbuilding industry."

The section of the agreement covering wages specified that journeymen machinists, a principal classification, should receive $1.12 per hour in Coast shipyards. The San Francisco wage scale, generally above that in other parts of the Pacific Coast, had previously been $1.00 per hour, and the $1.12 rate represented a concession upon the part of shipbuilders in other cities. San Francisco workers, who had been receiving double time for overtime prior to the agreement, were cut down to time and a half for Saturdays and double time for Sundays.

In the vote of the unions on ratification of the agreement, the Metal Trades Councils of Coast cities, including San Francisco, and the majority of all local unions affected by the agreement voted to put the pact into effect. Among those voting against ratification was AFL Machinists' Union, Local 68, San Francisco. It was one of a small minority.

Apparently at that time, No. 68 was willing to take its 12-cent raise and abide by the agreement, but soon trickles of trouble began to show up the rat holes on the ship peace. Coincident with the shipyard labor conference No. 68 had been negotiating for a new contract with San Francisco machine shops. As in their original demand to the shipbuilders, the union asked $1.25 an hour for journeymen machinists. Anxious to avoid trouble, and apparently believing that there was some logic in the idea that machinists who work in uptown machine shops should receive approximately the same wages as those who do similar work in the shipyards, the employers' group almost immediately offered to split the difference between former rates and the union's demand, offering $1.12½. Local 68 tempered its demand to $1.15, but would go no lower. Not having any particular desire for avoiding work stoppage, the union stuck by this demand and finally struck.

After 21 days, the machine shops acceded to the $1.15 rate, and also to continuance of double time pay for all overtime work. Then, the magnitude of the rat holes in the Coast shipyard agreement began to show.

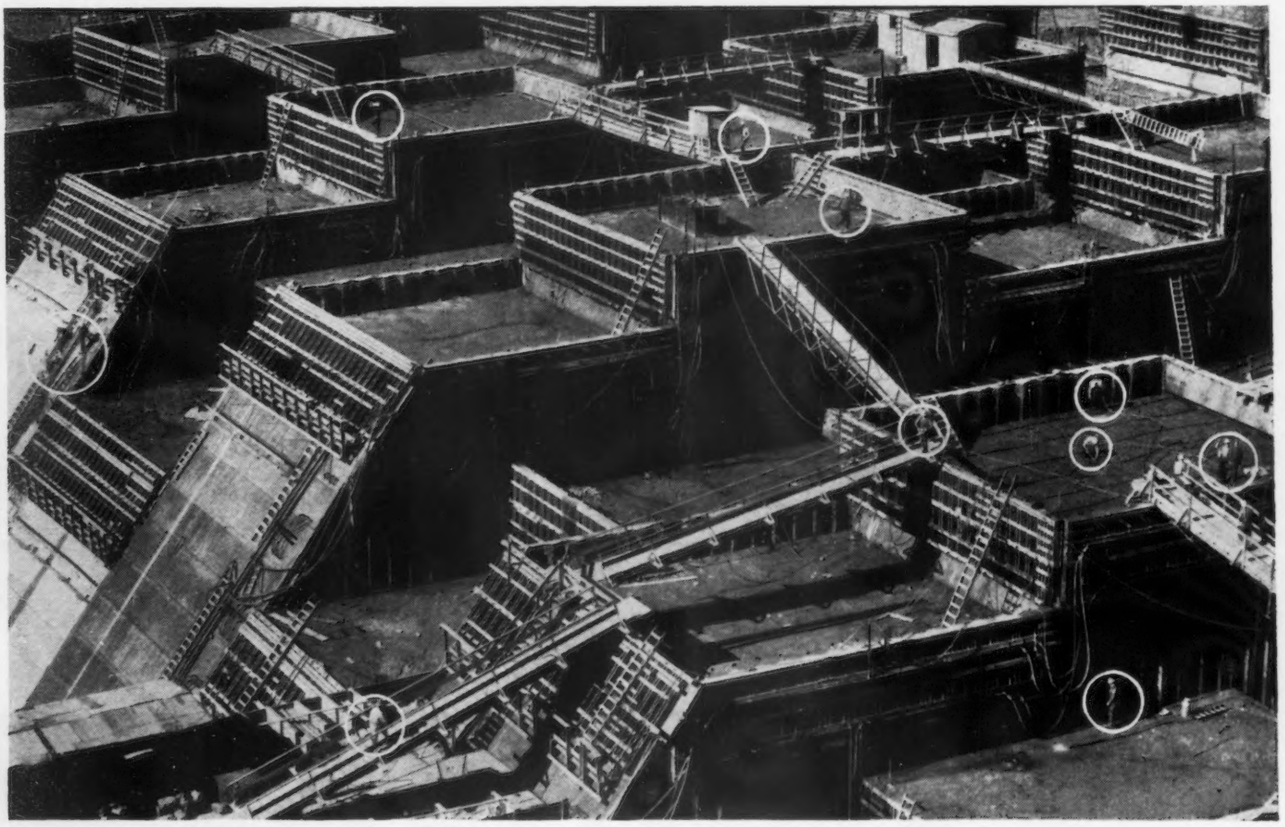
When Saturday, May 2, rolled around at the Bethlehem San Francisco shipyard, the machinists did not show up for work. Reason: Bethlehem, although it had not signed the Coastwise agreement, was following the wage standards set up therein; this meant time and a half for Saturday work instead of double time as previously. No picket lines were set up that day and the balance of the yard workers carried on.

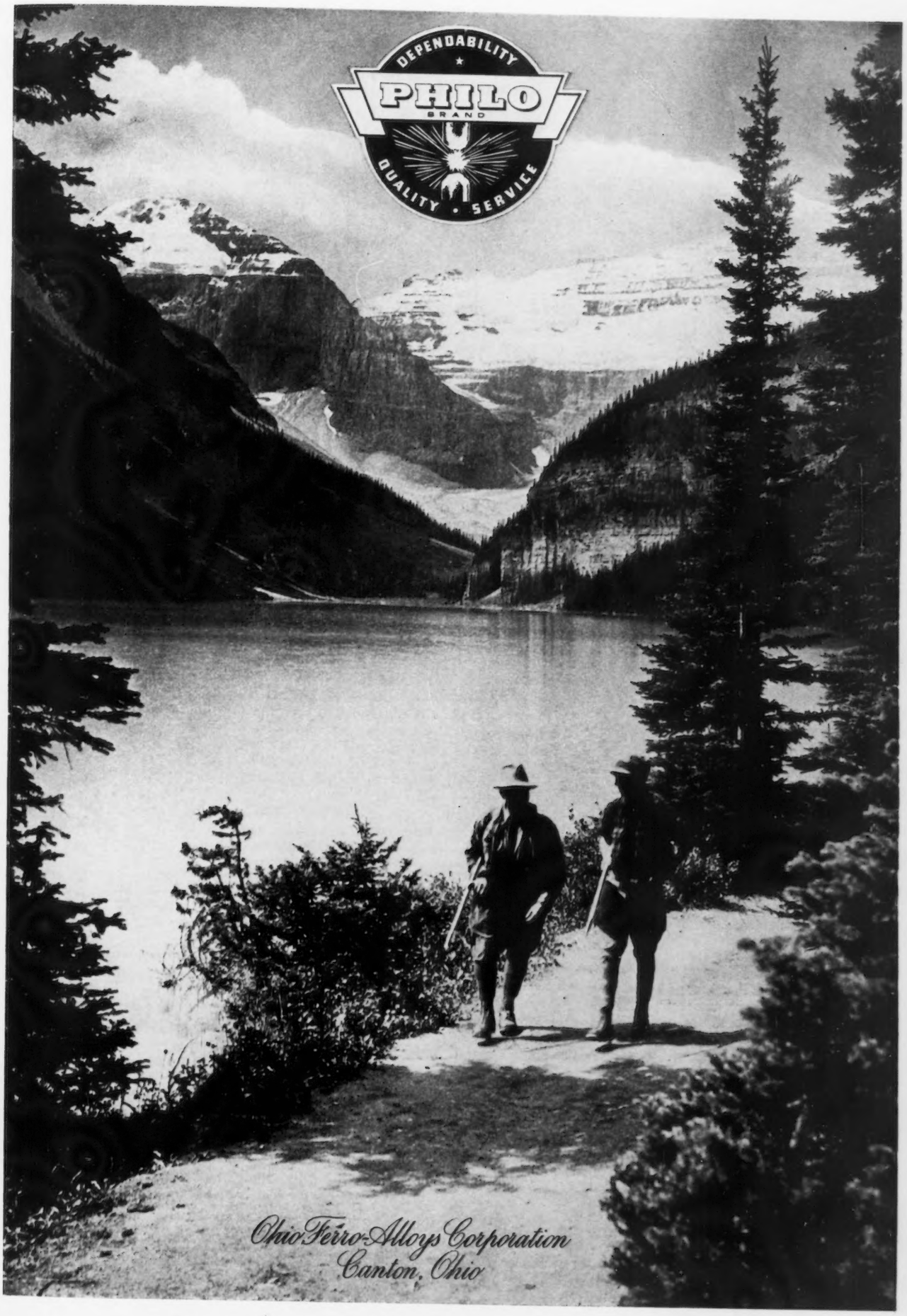
The following Monday the machinists came back to work, and worked through Friday as usual, then on Saturday duplicated the previous week's performance. Still there were no picket lines, other shipyard workers continued at work, and other Bay region yards were not affected. Then on Monday, the union really began to pump water through the rat holes in the Coastwide agreement. Picket lines were established by Machinists' Local 68 around all San Francisco shipyards and ship repair yards (Western Pipe & Steel Co. which is located at South San Francisco, was not affected). Simultaneously CIO machinists in East Bay shipyards walked out, established picket lines. The San Francisco strike, incidentally, was not approved by the Bay Cities Metal Trades Council (AFL) which had signed the Coastwide agreement.

In San Francisco Local 68 asserted that it was unjust that machinists working in uptown work shops should receive more pay than those working in shipyards, then stated that it had voted against ratification of the Coastwide agreement, but made no reference to the fact that it had been outvoted by the other unions. Insofar as Bethlehem was concerned, the union declared that this company had signed no agreement with anyone, was not a party to the Coastwide agreement although it followed its provisions, and that a strike was perfectly justifiable against this company. In the East Bay, the CIO machinists' union, with the backing of the County Industrial Council, denounced the Coastwide AFL-employer pact, and stated it had no agreement with anyone. About this time, it was recalled that Pacific Coast waterfront and dock employers had had little satisfaction from local labor agreements until performance was guaranteed by national rather than local leaders.

Pacific Coast employers began to wonder how big the rat holes in the Coastwide shipyard agreement really were going to get when Associate OPM Director Sidney Hillman, after a conference with President Roosevelt, made an urgent appeal that AFL machinists end the strike in San Francisco shipyards and made no mention of the CIO picket lines which barred entrance to six Oakland ship plants.

SHASTA DAM: More than 1,000,000 cu. yd. of concrete have been poured in Shasta Dam, which is being built by Pacific Constructors, Inc., under direction of the U. S. Bureau of Reclamation. Some of the workmen are shown in the white circles against the pattern of blocks. The blocks are 50 ft. sq. and are raised alternately, 5 ft. at a time, in staggered rows.




DEPENDABILITY
PHILO
BRAND
QUALITY • SERVICE
Ohio Ferro-Alloys Corporation
Canton, Ohio

Fatigue Cracks

BY A.H.DIX

Seventh Son

• • • Tom Campbell, your Pittsburgh seismographer, asks us to gloat in print over the fact that a recent revolutionary pronouncement from Washington was predicted weeks ahead by your Capital correspondent, Leon Wesley Moffett.

We refuse the invitation to boast for "Moff," because he is modest and will deny that he has more than his share of prescience. Calling the turns comes strictly within the line of duty. No Delphic touch is needed. It is simply a matter of keeping an eye on the pressure points, getting around to the right places and doing a lot of listening, and then asking yourself, "What will be the obvious outcome?" As the obvious thing usually happens, you're right most of the time. Maybe you have noticed that your favorite family journal has been hitting the bull's-eye with the regularity of Annie Oakley in her prime.

Of course, there are those who get a kick out of surprises and who go around with their hands held up in perpetual astonishment, like the farmer's daughter on her first trip through "The Old Mill." But we shall continue to serve as a microscope for the benefit of those others who want to know the location of warning cracks that are likely to develop into fractures.

Aptronyms

And then there's the Ordnance Department's Lt. Col. W. R. Slaughter.

Mookerjees Galore

• • • Speaking of names, Jim Rowan, our news editor, has passed along to us a house magazine issued by Martin & Co., Calcutta, which operates metal-working plants, collieries, warehouses and other businesses in India. In the magazine is a list of Martin personnel, among which are dozens and dozens of Mookerjees. Mookerjee is probably equivalent to Smith in India, but the spelling has not yet jelled. A casual examination reveals that there are Mookerjees, Mukerjees, Mukerjes, Mukherjees, and Mukherjes. That's just the beginning. We could go on and on, and there are so many of them that they have nearly run out of initials.

The toll on telephone operators must be terrific. After hearing *"I want to talk to Mr. Mookerjee"* a dozen times a day, asking *"Which one?"* and being told, *"The short one with the bald spot and little potbelly,"* or *"The tall one with stomach ulcers,"* the operator is bound to reach her elastic limit within a matter of months.

All this can be cured by adopting a device we have just run across in Stuart Chase's *The Tyranny of Words.* Simply call them Mookerjee$_1$, Mookerjee$_2$, and so on.

Wolf, Wolf

• • • Frank Vanderhoff, of our field staff, saw this sign in the home town of—as we write this—the league-leading Dodgers:

GOING OUT OF BUSINESS
THIS TIME POSITIVELY

Steel with an Aura

• • • A phrase we never liked is "plus value." It has had quite a play recently in advertising circles, but over-use quickly blunted its edge and it is now as passé as last month's Hit Parade leader. But before it is buried we would like to use it just once, as it applies to stainless steel referred to in one of our recent issues. This steel was mentioned as being of "the 18-88 type." That makes 106 per cent, a genuine plus value.

Cool It With Heat

• • • We are indebted to Peirce Lewis, one of your favorite family journal's advertising ambassadors, for this, clipped from a Cincinnati restaurant menu:

CALM YOURSELF
with a
Mexican Chili with Hot Tamale
Mixed Salad
40c Including Beverage

Dead Flies in Their Pockets

• • • Our favorite among the week's automotive press releases is about Lincoln's Joe Hillmaster, who paints crests, monograms and coat-of-arms on car doors for those to whom a boost of ½¢ a gallon of gas is no cause for anguish. Joe reminisces about the old days when cars were varnished instead of lacquered:

"One little house fly might hold up an entire varnish job. Each coat was dried in a dark room filled with formaldehyde fumes to discourage stray flies. If a brush man botched a varnish spot, he was supposed to fix it on his own time. But flies were different; so some of the men carried dead flies in their pockets. It was easy to stick a fly on a bad spot and leave it there to take the blame."

But the statement that tugs at our heartstrings is this:

"Supporting a fatherless family, Joe, at 14, earned money drawing stripes on baseball scoreboards."

In baseball's palmiest days Joe couldn't have found more than a dozen prospects to work on in Detroit and environs, and like as not if he trudged all the way out to the diamond of the Hamtramck Terriers, on the outskirts of town, he would be told, *"Sorry, sonny. We had it done last season."* And if he heard the paint was peeling on a scoreboard upstate in Port Huron the cost of getting there would have eaten up all the profit.

There must have been many a hungry night for the Hillmasters unless Joe pocketed his pride and striped an occasional bowling alley scoreboard.

The Sun Sets South—and North

Apropos the Marc St. Hilaire line, where and when in the northern hemisphere does the sun rise in the true east and set in the true west?

Where and when does it rise in the north and set in the north?

Where and when does it rise in the south and set in the south?

Yes, I can give the answer.

—*W. H. Rastall, U. S. Tariff Commission*

We wouldn't know, as we don't get around much, and our guess is that among the eighteen certified readers of this page at least half are as ignorant of the answer as we are. So unless some of the master minds come through with the answer we will ask Mr. Rastall to give.

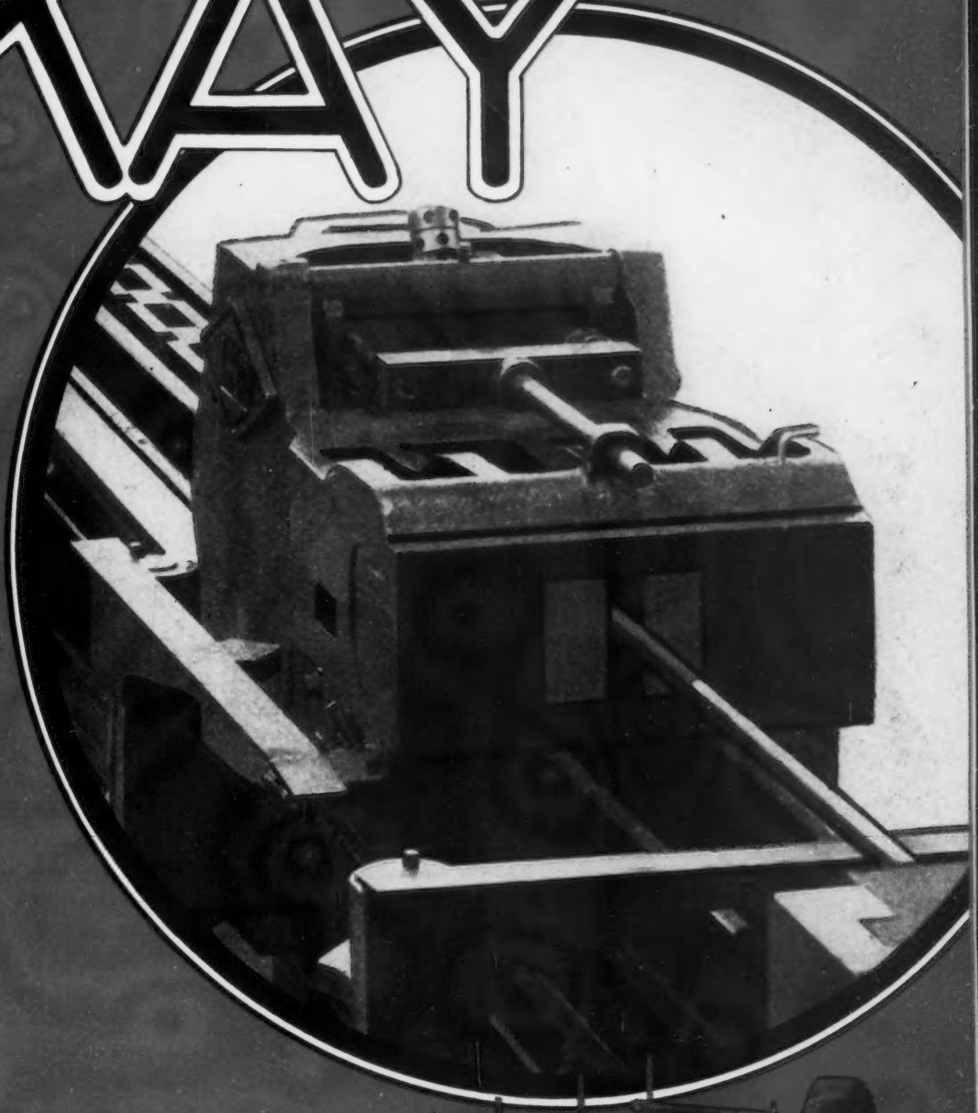
Puzzles

• • • You ought to get 16 to 1 odds on last week's bet. This one will hardly ripple your cerebrum:

A man boards the rear end of a train at Station A. The train travels to Station B, a distance of 8 miles. The rear end of the train is standing at Station A at the start and the train stops with the locomotive at Station B at the finish. The train is one mile long. As the train pulls out of Station A the man begins walking toward the locomotive. When the train reaches Station B, how far has the man walked and how far has he ridden?

McKAY

Tube & Bar
DRAWBENCHES

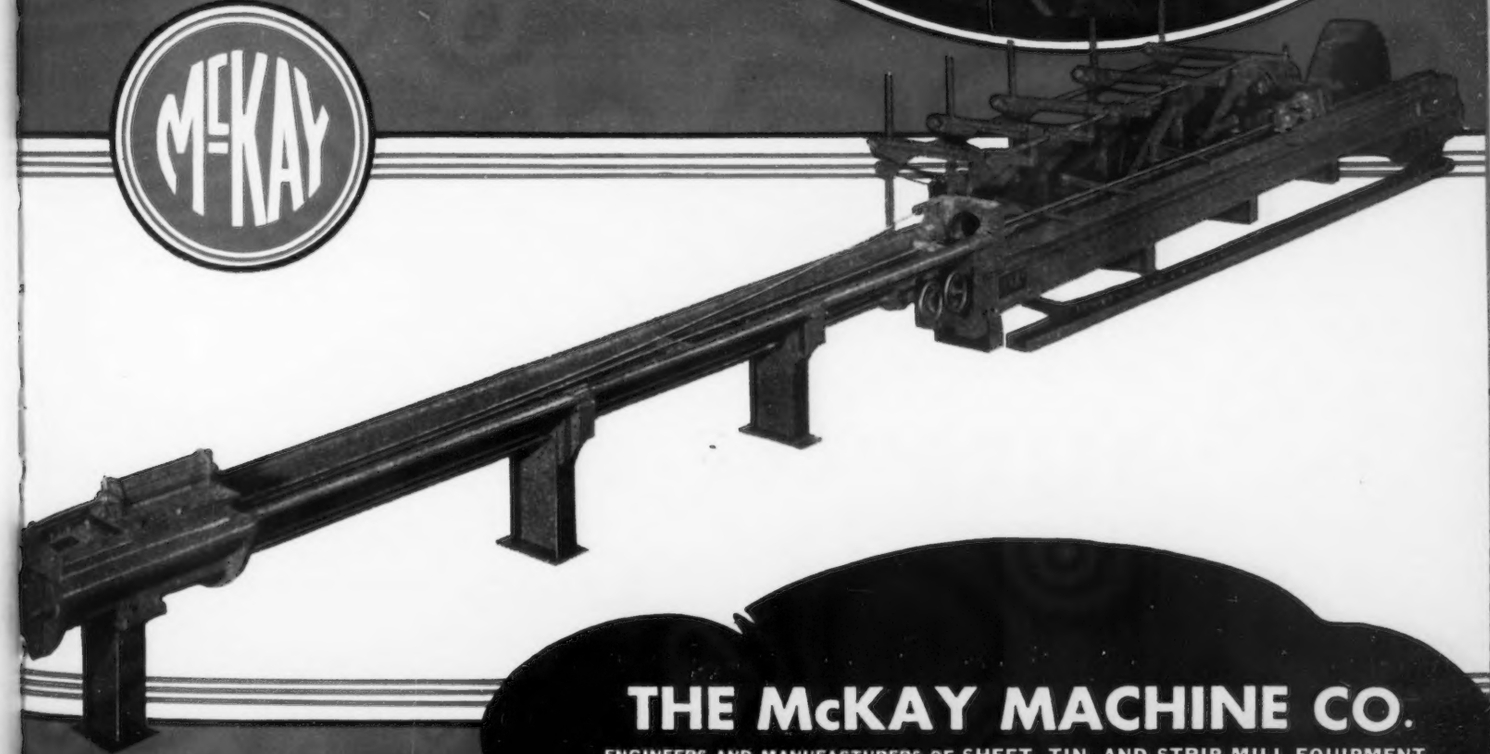


DRAWBENCHES for steel and non-ferrous tubes and bars, with conventional electric drive or automatic AC or DC drive for slow starting and acceleration to the drawing speed.

The automatic draw grip permits quicker interchange of the draw bits for size.

Push button control initiates the automatic drawing cycle.

Faster grip with automatic deceleration and air cushioned stop with positive positioning for gripping the tags, increases production and diminishes scrap.



We solicit your inquiries for tube and bar drawbenches. We also build complete tube forming, sizing, welding and cut-off equipment.

THE McKAY MACHINE CO.

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

They also Serve
WHO CONSERVE

TUNGSTEN has become a strategically important material, in view of the huge demands of industrial and defense needs, which require High Speed and other tungsten steels in day-by-day increasing quantities.

In the case of High Speed Steels, although 18% tungsten alloys have been standard for years, it is now felt desirable to conserve national supplies by employing *lower* tungsten-content steels wherever practicable. With DBL High Speed Steel, a change-over can be effected without disadvantages, and with actual benefits.

DBL, a development of Allegheny Ludlum research, is a 5½% Tungsten High Speed Steel, thus containing less than one-third as much tungsten as "18-4-1." In addition:

1. DBL equals or betters "18-4-1" in performance.
2. It heat-treats and handles in the same equipment and by the same methods as "18-4-1."
3. It requires no coating to control decarburization.
4. It costs less and is lighter than "18-4-1;" the user secures more pounds of DBL per dollar, and more tools per pound.

● Under normal circumstances, being ourselves large producers of "18-4-1," we would have introduced DBL more gradually. *But these are not normal times.* To steel and tool manufacturers, therefore, we offer a royalty-free license to use DBL. To all users, complete technical data is available upon request for the "DBL Blue Sheet." Write Dept. T-19.

ALLEGHENY LUDLUM

STEEL CORPORATION — **PITTSBURGH, PA.**

Tool Steel Division — AL — *Watervliet, N.Y.*

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KEEP POSTED ON INDUSTRIAL PRODUCTS

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(1) Turret Lathes:
Complete line of turret lathe tools for use on ram and saddle type turret lathes is described and illustrated in 168-page loose-leaf catalog. Applications and principal dimensions of all tools are shown, dimension drawings being large enough to permit direct scaling to layout sheets. Cross-referenced 10-page index of all tools is included. Only company-addressed requests are accepted. *Gisholt Machine Co.*

(2) Transmissions:
Principles of metallic traction, with explanatory curves and diagrams, are set forth in manual 501. Included is a description of the reversing feature, available on some variable speed transmissions, which delivers equal speeds forward or reverse without stopping or reversing the motor. Summary of applications of various types of variable speed transmissions is included. *Graham Transmissions, Inc.*

(3) Stainless Fabrication:
Fabrication of stainless steels is the subject of 28-page technical bulletin. Methods covered include welding, drawing and blanking, machining, spinning, upsetting and forging, riveting, shearing, soldering and brazing, annealing and heat treatment, grinding, polishing and buffing, and surface treatment. Seven types of chromium-nickel and 12 types of straight chromium grades are listed. *Allegheny Ludlum Steel Corp.*

(4) Railroads:
Exhaustive fund of information, presented in question and answer form, covering the major railroads of the country, including statistics, history, activities, organization, physical plant, etc., is contained in booklet. Views show car repair, chemical laboratories, car kitchens, facilities for service to industry, etc. *Association of American Railroads.*

(5) Plastics:
Use of Textolite, plastic material, is subject of illustrated booklet. Among phases covered briefly are development, designing and styling, application and product engineering, moldmaking, compression, injection and cold molding, industrial and decorative laminating, fabricating, and finishing. Finished products are shown. *General Electric Co.*

(6) Boring Machines:
Points to be considered in the design of a machine for special applications in drilling, tapping, boring, milling and honing work are described in leaflets. Thorough analysis of purposes for which machine will be used and discussion of previous production difficulties are stressed. Machine for cylinder and gun tube work is described. *W. F. & John Barnes Co.*

(7) Magnetic Control:
D.c. magnetic controls designed for use with machine tools, materials handling equipment and other forms of machinery, with which there has been a recent trend toward the use of d.c. current, are described in bulletin 138. Among types shown are a special planer control in floor mounting type enclosure, 50 amp. double pole contactor, interlocks, overload relays, etc. *Square D Co.*

(8) Carburizing Baths:
Economical carburizing baths giving greater case hardness and eliminating adhesion of salt, frequent replacement of pots and reaction in the bath itself are described in leaflet. Bath described protects own surface from oxidation, reduces heat losses, prevents corrosion, minimizes drag-out loss, produces uniform case and allows the work to be washed clean in either hot or cold water. *Case-Hardening Service Co.*

(9) Wire Feeder:
Construction features and operating characteristics of automatic wire feeder are shown and described in leaflet. Simplicity of set-up and ease of operation are said to afford maximum of efficiency and economy. Rapid adjustments permit complete range of wire diameters and lengths to be fed by machine. Straightened and cut wire from 9 to 18 in. long may be handled in diameters from 1/16 to ½ in. *Moslo Machinery, Inc.*

(10) Wire Rope Slings:
Complete specifications, assembly diagrams and illustrations covering wire rope slings and fittings are contained in catalog S-6. Braided sling body of 8-part construction is composed of two endless pieces of wire rope, right and left lay of which are folded to provide two right and left lay members. Rope traverses entire length of sling body at least four times, making chain-like structure. *MacWhyte Co.*

(11) Lathes:
Combined with detailed descriptions of the company's line of lathes, 78-page booklet, "America Sings," presents short, heroic descriptions of the economic situation, progress and future of America, in terms of industry and commerce. While complete technical information is presented with simplicity an appeal is made to the broader human side of the buyer. Relation of industry to the national defense program is stressed. *R. K. LeBlond Machine Tool Co.*

(12) Low-Alloy Steel:
Physical properties and installation views of Mayari R, low-alloy steel for ap-

(5A)

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New York, N. Y.

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plications requiring light weight, high strength and increased corrosion resistance are shown and described graphically in catalog 156. Advantages are said to include exceptional workability, excellent welding qualities and uniformity. Results of corrosion resistance tests are diagrammed. *Bethlehem Steel Co.*

(13) Tool Steel:

Brief history of company, description of manufacturing facilities and methods and detailed description of various grades of tool steel, combined with illustrations, are contained in bound volume No. 100-S. Working instructions for all grades, a table of sheet steel weights, S.A.E. specification tables, and booklet covering classification of extras, are included. *Henry Disston & Sons, Inc.*

(14) Plastics:

Under the heading, "Plastics' Contribution to National Defense," booklet lists five plastic materials with different properties. Lustron features acid, alcohol and alkali resistance, zero water absorption, high electrical insulating properties, ready moldability, low unit weight, high dimensional stability and transparency. *Plastics Division, Monsanto Chemical Co.*

(15) Hydraulic Cylinders:

Sectional views, dimensions, operating characteristics, tables showing pressure per square in. and general description of hydraulic cylinders are given in catalog H-40. Tables giving maximum strokes and alternate piston diameters and areas are included. Rotating cylinder applications are shown with formula for ascertaining the amount of pressure loss due to friction in pipe lines. *Tomkins-Johnson Co.*

(16) Plastic Coatings:

Diversified uses to which Amercoat, corrosion-proof and non-contaminating sprayable plastic coating, can be put, are shown in 16-page brochure. Uses vary from protection against salt water to a lining for food and beverage containers. Pliable, abrasion-resistant film is said to be impervious to many acids, alkalies, oils, fats and alcohols. Installation views are shown. *American Concrete & Steel Pipe Co.*

(17) Machine Tools:

Views of the plant, manufacturing and assembly facilities and personnel of company together with a description of the company and its operations, are contained in company publication. Importance of machine tools in the national defense program is stressed. *Ex-Cell-O Corp.*

(18) Motors:

A.c. synchronous motors for compressors and generators for diesels are shown and described in bulletins. Complete pole assembly for slow speed revolving field synchronous machines is securely fastened to rotor by large double-ended studs. Studs pass through rotor rim and screw into large rectangular steel rivet in body of pole piece, pole assembly being drawn firmly against rotor by nuts on inside of rotor rim. *Burke Electric Co.*

(19) Structural Welding:

Arc welding for building construction is the subject of 16-page booklet. Advantages stressed include decreasing of weight and cost of structural steel members through elimination of rivet holes, saving of material in structural connections, greater freedom in architectural and structural design, elimination of cost of punching and drilling holes, and facilitation of remodeling and additions. *Air Reduction Co.*

(20) Fans:

Multi-blade and standard steel plate fans are shown and described in catalog No. 220. Overhung pulley, direct connected and overhung wheel types are shown. Capacity tables, directions for their use, and friction chart included. *Garden City Fan Co.*

(21) Cranes:

General hand-operated hoisting equipment, trolleys, and cranes, in addition to new model floor type and portable floor cranes and winches, are described in catalog 12-C. Complete data is included on spur-geared, screw-geared and differential hoists, as well as engineering information on cranes, trolleys and winches. *American Chain & Cable Co., Inc.*

(22) Wiring:

Handy calculators giving new wire sizes, capacities and data for wiring motor circuits is given on card. One side is devoted to wire sizes, capacities and contact data, with respect to code grade wire, performance grade and heat-resistance grade. On other side data includes wire and conduit size for each grade of wire together with the fuse and branch circuit capacities for different motor sizes. *Bulldog Electric Products Co.*

(23) Lathes:

Many sizes and types of back-geared, screw-cutting lathes for manufacturing, tool room and general shop work are shown in large, profusely-illustrated general catalog. Sizes run from 9 to 24 in. swing, each one shown in several different models with motor and countershaft drive, in quick and standard change gear. *South Bend Lathe Works.*

(24) Motors:

Maintenance of d.c. motors is subject of catalog 3488. Periodic inspection of motors is said to insure longer life and help minimize production interruptions. Subjects covered include selection of motors, inspection and servicing, inspection records, overhauling and repairs, spare parts and safety. Trouble correction chart is included. *General Electric Co.*

(25) Gear Production:

Short cuts for aid in the cutting and checking of gears are given in simple form in 44-page booklet. Included are change-gear formulae and tables for hobbing machines, formulae and tables for checking gears by ball and pin method, tables on hobbing speeds and decimal equivalents of fractions for use with change-gear formulae, together with hob-checking equipment information, and formulae for calculating hobbing time. *Michigan Tool Co.*

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News of Industry

o o o

Vacations and Defense Studied in Steel Mills

Pittsburgh

• • • **Most workers in major** steel companies here will receive actual vacation time off this year but in many instances the periods will not coincide with normal vacation months, according to an IRON AGE survey.

In conformance with the government's desire that defense production should not be curtailed because of vacations, those steel employees whose services are definitely needed continuously because of defense production will be granted vacation pay in lieu of time off.

SWOC contracts governing their members in steel companies here stipulate that the management shall determine whether eligible employees will be required to continue work and receive a vacation pay in lieu of actual time off, "however, it is the intent that to the greatest degree possible in management's judgment, eligible employees shall receive the benefit of vacation from work."

In other companies where the vacation plan is optional as to time off or pay in lieu of time off, the employees' wishes will be granted as long as such action does not interfere with defense production. It has been learned, however, that the large steel companies can and will schedule their vacation plans in such a way that most eligible employees will receive at least a week's vacation.

In those instances where it finally becomes necessary later in the year to omit vacations, the employees will be assured of a vacation pay predicated on a normal week in that period when vacations would ordinarily be taken, or, in other words, a maximum pay period.

In smaller steel and manufacturing concerns, the problem of vacation scheduling without interfering with national defense work is more difficult than in the larger companies where man power is more flexible. It is expected that some of the smaller concerns, because of the high percentage of defense work to their total production, will find it necessary to grant vacation pay in lieu of time off where the employee is entitled to such treatment. One example of this action is the Heppenstall Co. here which received a request from its employees recently that they continue work as a contribution to national defense and be paid for the time not taken off. Another example is the action of International Nickel Co. of Canada, Ltd., which has a plant at Huntington, W. Va., in asking its non-salaried employees in the

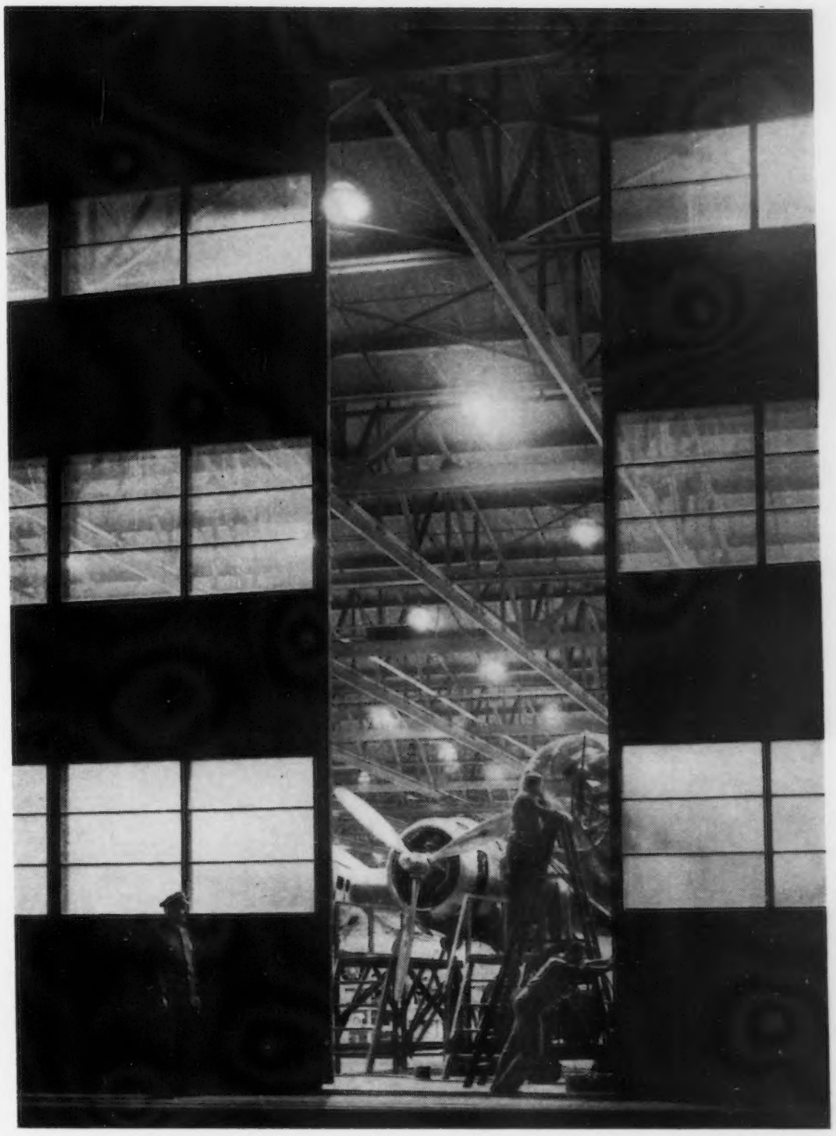
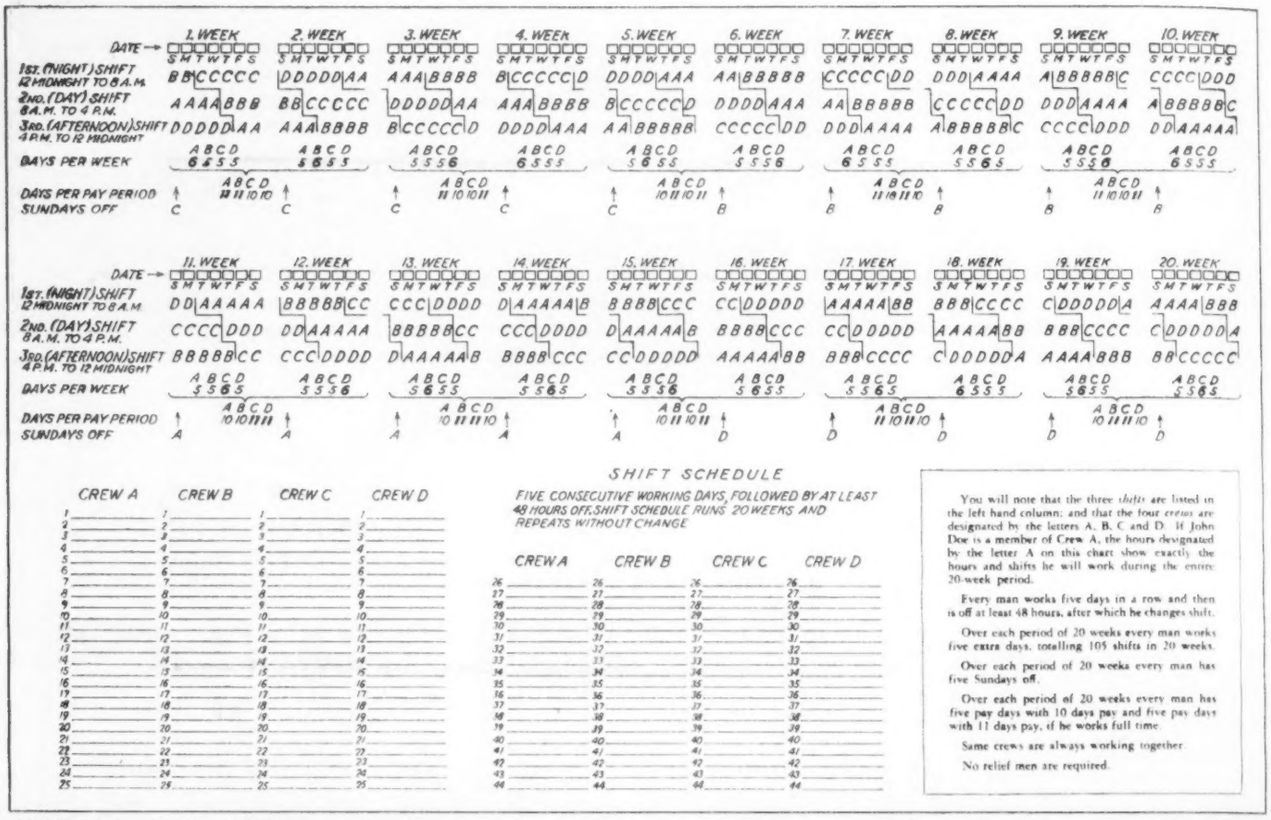


Photo by Harris & Ewing

THE OPEN DOOR: Each time these doors in the Boeing Aircraft Co.'s Seattle plant opens, a new B-17D Flying Fortress is moved to Boeing Field and delivered to the Army.



ANTI-BLACKOUT SCHEDULE: Timken Roller Bearing Co., Canton, Ohio, has worked out the above system of rotating labor shifts and has notified the OPM its week-end blackout of production has ended. (See box above for explanation of the system.)

United States to accept a bonus of one week's pay instead of the customary week's vacation, in order to expedite the national defense program.

An informal survey at one plant in this area disclosed that approximately 80 per cent of the employees desired actual vacation time off and it is known that as far as possible, companies in this area favor actual vacations as a health safeguard for their employees. A canvass of industrial engineers and doctors here discloses that from an industrial hygiene and safety standpoint and in view of the extreme tempo of the times, vacation periods should be granted wherever it does not conflict with maximum production of national defense.

There will be numerous cases of plants allowing either vacation time off or pay, where employees will desire the latter in order to make up for lost time due to strikes at plants, other than their own, which held up raw materials and production.

Mycalex Plastic Available For Injection Molding

• • • **Injection molding** of Mycalex, a material consisting of ground mica and a specially developed glass, has been announced by the plastics department of the General Electric Co. at Pittsfield, Mass. Heretofore, Mycalex has been compression-molded in plate and bar form, and machined to required designs. It also has been molded by direct compression methods into various important insulating parts such as rectifier seals, and brush holder studs in which metal members are required as integral parts. By the injection process the material can be produced in more intricate shapes and many new applications should result.

In general, G-E Mycalex has better electrical characteristics than porcelain, and has comparable mechanical strength. It is not as refractory as porcelain or mica but is far superior in this respect to the ordinary molded insulations made with organic materials. In addition, Mycalex has low power factor, high arc resistance, chemical and dimensional stability, and low coefficient of thermal expansion. It is impervious to water, oil and gas and is unaffected by sudden temperature changes. Metallic inserts can be readily molded into the parts.

General Electric is molding several grades of Mycalex which have been applied as tube bases, switch insulation, structural parts in radio transmitters, arc chutes, relay insulators, terminal insulators and as inserts in die castings and organic plastics.

Coming Events

May 22—American Iron and Steel Institute, annual meeting, Waldorf-Astoria, New York.

June 1 to 6—Society of Automotive Engineers, summer meeting, White Sulphur Springs, W. Va.

June 23 to 27—American Society for Testing Materials, annual meeting, Chicago.

SWOC Wins NLRB Ballot At Lackawanna 3 to 1

• • • **In the first** National Labor Relations Board election to be held in a Bethlehem Steel Co. plant, the C.I.O. Steel Workers' Organizing Committee last week won, by a three-to-one margin, the right to represent Lackawanna, N. Y., employees of the Bethlehem company. After the election, which resulted from a 36-hour SWOC strike last February, the union announced that it was prepared to "move forward to victory" in other Bethlehem plants.

The Labor Board, which ordered the election subsequent to an investigation, provided for in the strike agreement, by the Office of Production Management, reported that 8223 votes were cast for the union, 2961 against it. Of the plant's 14,000 employees, 12,445 were eligible to vote in the 19-hr. election. Only 855 failed to ballot; 292 ballots were challenged; 24 were improperly marked; 29 were blank; and 61, cast by employees called to military service, were not counted because they could not have affected the outcome.

Fire Damages Machine Shop Of Cramp Shipbuilding Co.

Philadelphia

• • • **The machine shop** of the Cramp Shipbuilding Co. here, which has Navy contracts totaling $113,000,000, was damaged last week in a fire which swept a nearby lumber yard. H. Birchard Taylor, vice-president of the shipbuilding company, said that it would take about a month to get the damaged machine shop back into operation, but that work on the Navy contracts would not be affected.

SAE Summer Meeting June 1-6 At White Sulphur

Detroit

• • • **The annual summer** meeting of the Society of Automotive Engineers is scheduled for June 1-6 at the Greenbrier, White Sulphur Springs, W. Va. It will be devoted largely to engineering aspects of the national defense program and will include special sessions on aircraft engines, diesel engines, transportation and maintenance problems, trucks and buses, passenger cars and fuels and lubricants.

One session will be devoted to a discussion of substitute materials for automobile parts and another will reveal the latest developments in Army tanks. A German aircraft engine, the famous Daimler-Benz, will be on exhibit with parts disassembled for display.

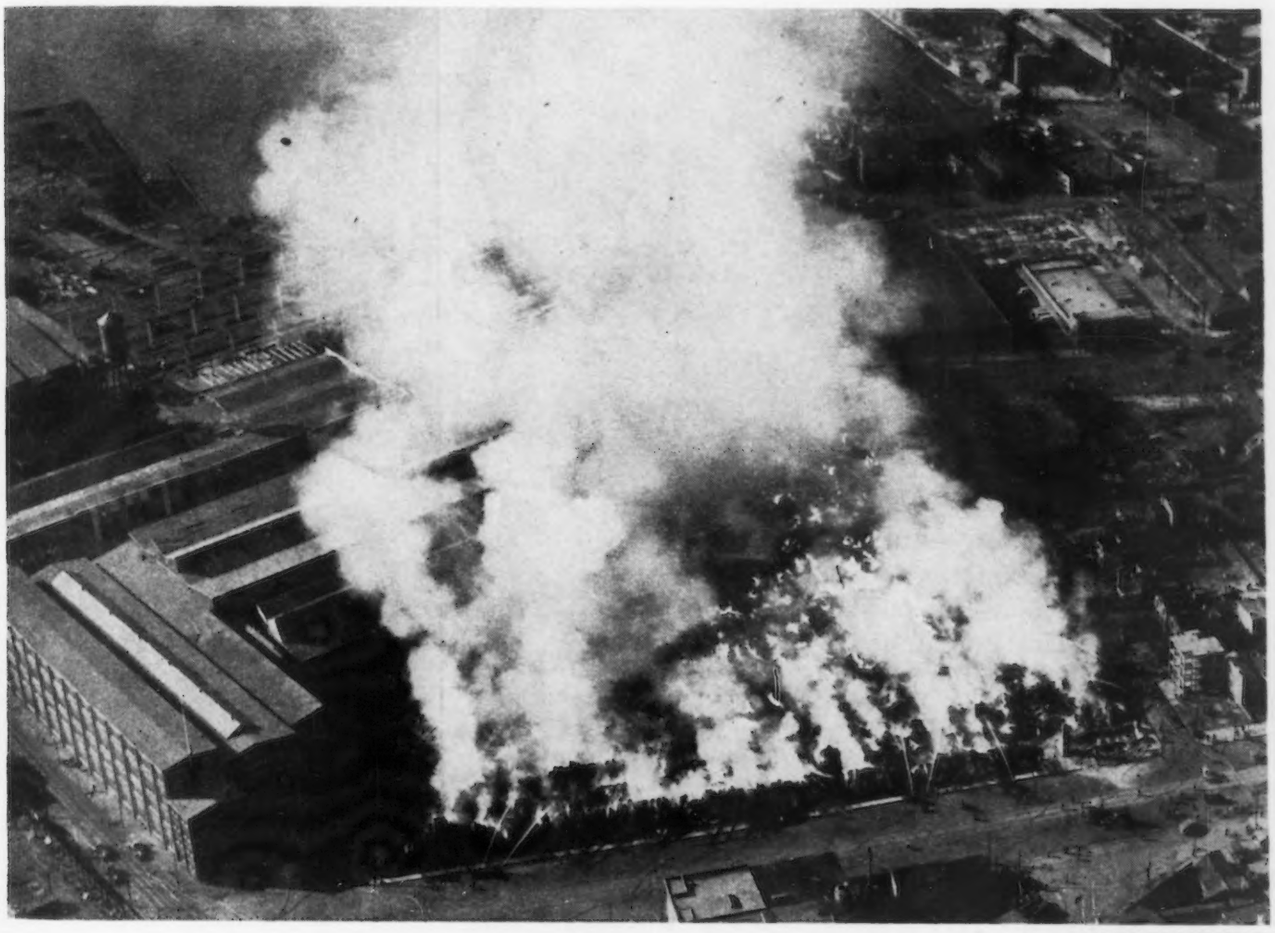


Photo by International

SABOTAGE?: When a $5 million fire raged last week in the East Girard Avenue section of Philadelphia, threatening the Cramp Shipyards, authorities investigated the possibility of sabotage.

Deliveries Begin on 155-mm. Gun Carriage

• • • **American Locomotive Co.** at Dunkirk, N. Y., last week delivered to the Army Ordnance Department the first modern 155-mm. gun carriage to be commercially produced in the United States, the War Department announces. Mass production of the carriages will begin in 30 days.

The carriage will be complete with gun assembled. Gun and carriage weigh upwards of 30,000 lb. Riding on eight pneumatic tires, guns of this type have on tests been drawn at a speed of more than 30 m.p.h. over a 1000-mile route.

Photo by Wide-World

CLEANING A LOUD SPEAKER: Members of the crew of a 10-in. gun at Fort Rosecrans, San Diego, Cal., are cleaning the gun's barrel after firing at a target eight miles away. The gun is one of a battery.

Immediate Shipment

On DoAll Contour Machines

Because our manufacturing facilities were increased 400% early in 1940, before the defense program started.

Because we use arc welded construction for greater speed, and have developed a process of attaching pads that have machined surfaces, which eliminates handling and machining heavy frame work.

Every 40 minutes we take a DoAll off our 1,000-foot assembly line.

Like Detroit's auto plants—DoAlls are built as fast as needed — giving you higher value.

Now recognized as the indispensable machine tool, this new shape-cutting process has revolutionized machine shop practice throughout the world.

Again the progressiveness and foresight of the DoAll Organization is demonstrated in making immediate shipment to aid American industry in meeting today's demand for greater and faster production.

NO MACHINE TOOL "BOTTLENECK" HERE

CONTINENTAL MACHINES, INC., MINNEAPOLIS, MINN.

Associated with the DoAll Co., DesPlaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines

Steel & Wire to Rebuild Duluth Openhearths

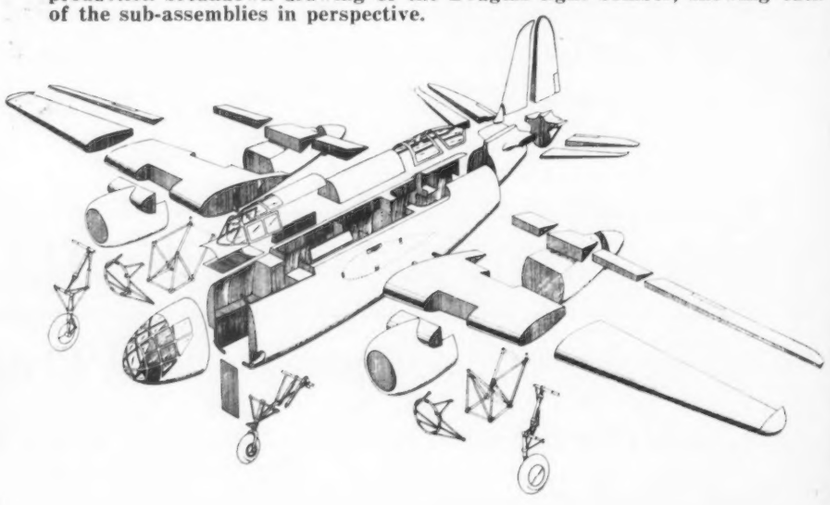
• • • **Two open hearth** furnaces of the American Steel & Wire Co., a subsidiary of United States Steel Corp., which have not been in operation for several years are being rebuilt at Duluth, Minnesota. These two furnaces, when placed in operation, will increase the annual ingot capacity of American Steel & Wire Company to the extent of 174,000 tons. The first furnace is expected to be finished by the latter part of June and the other late in July.

Few Milwaukee Plants Will Have Vacations in '41

Milwaukee

• • • **Vacations in industry** here will be few this summer, according to a survey of various factories here. Because of the rush of defense work many plant executives have announced they will pay double salaries for vacation weeks to their employees forced to go without them. One firm is splitting up its vacation periods so they fall over the Fourth of July week end and at Labor Day.

THREE-DIMENSIONAL drawings, made under direction of George Tharratt, top right, formerly illustrator with the British magazine *Aeroplane*, are used by Douglas Aircraft Corp., Santa Monica, Cal., to serve as guides to workmen untrained in reading blueprints. These drawings are employed by engineering, tooling, planning and other departments. There are 500 drawings of this type for each type of airplane. At the bottom is a typical production breakdown drawing of the Douglas light bomber, showing each of the sub-assemblies in perspective.

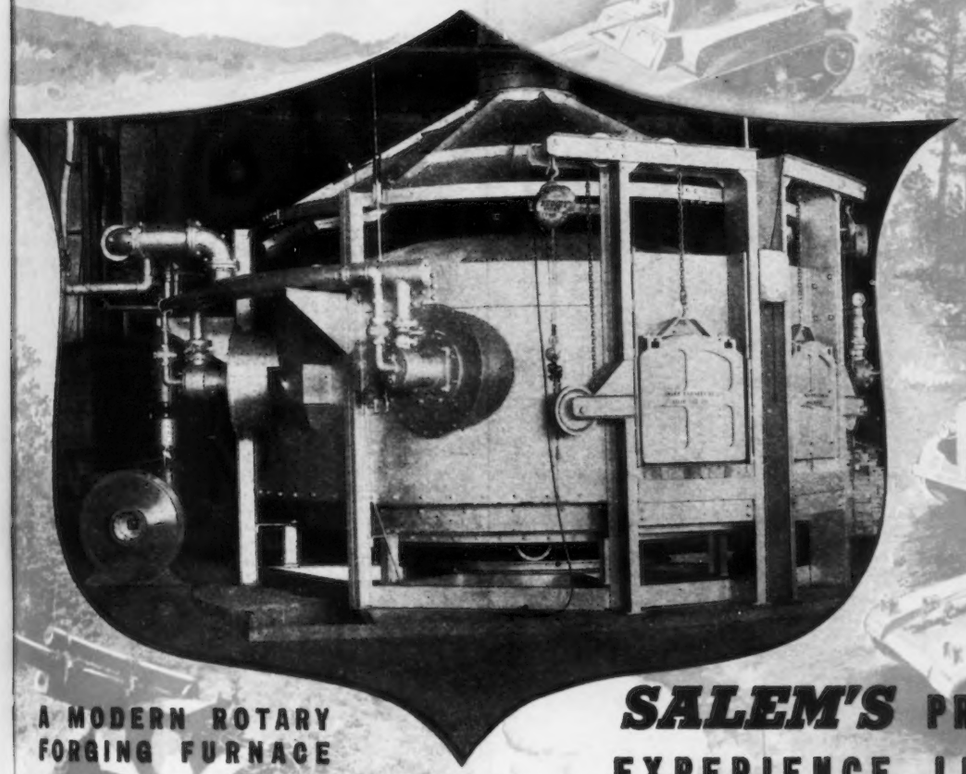


Speed

-INDUSTRY'S PASSWORD

SPEED • ECONOMY • DEPENDABILITY

ACCURACY • INCREASED PRODUCTION



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SALEM ENGINEERING CO., SALEM, OHIO DEPT. M

SALEM ENGINEERING COMPANY

Government Awards

Navy Dept., Bureau of Supplies and Accounts:

American Blower Corp., Washington; sets, ventilating; fans, propellor, motors, controllers and spares $34,720

American-LaFrance-Foamite Corp., Elmira, N. Y.; extinguishers, fire, portable 105,796

American Chain Division, American Chain & Cable Co., Inc., York, Pa.; chains and fittings, various 78,097

American Tool Works Co., Cincinnati; machines, drilling, radial, motor driven 65,616

Automatic Transportation Co., Chicago; trucks, crane, high lift .. 114,480

Baldt Anchor, Chain & Forge Co., Chester, Pa.; anchors 152,963
chain, etc. 339,432

Balfour, Guthrie & Co., Ltd., San Francisco; iron, pig, foundry .. 8,589

Bethlehem Steel Co., Bethlehem, Pa.; steel, bar, alloy 18,738

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; presses, hydraulic, joggling 47,350

Brandtjen & Kluge, Inc., St. Paul, Minn.; presses, platen, job press, elec. motor-driven 9,091

Brown & Sharpe Mfg. Co., Providence; machines, automatic screw 37,023

Busch-Sulzer Brothers Diesel Engine Co., St. Louis; propelling machinery and spare parts for minesweepers 9,305,560

C-O Two Fire Equipment Co., Newark; extinguishers, fire, portable 126,546

Carlton Machine Tool Co., Cincinnati; drills, radial, traversing.. 72,388

Chase Brass & Copper Co., Inc., Waterbury, Conn.; tubes, copper-nickel alloy 49,430

Chrysler Corp., Detroit; equipment for production of aluminum forgings 753,974

Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; machines, milling, horizontal tool room type, motor driven 35,318
grinder universal, hydraulic type 8,946

Circle Wire & Cable Corp., Maspeth, L. I., N. Y.; cable, electric 7,355

Commercial Engineering Co., Inc., Washington; centrifugal purifiers 34,651

County Supply Co., Plainfield, N. J.; plates, surface, lapping; tops, bench 6,678

Crucible Steel Co. of America, New York; forgings, steel 57,047

Curtiss-Wright Corp., Curtiss Airplane Div., Buffalo; airplanes and spare parts 20,444,414

Dana Tool-D Nast Machinery Co., Philadelphia; hammers, motor-driven 5,745

B. H. Deacon Co., Inc., Philadelphia; fittings, tube, flared, brass, rolled 9,267

Electric Storage Battery Co., Washington; outfits, storage battery testing and parts 32,200

Elwell-Parker Electric Co., Cleveland; crane, truck, heavy duty, telescopic boom 6,837

Enterprise Engine & Foundry Co., San Francisco; sets, generator, diesel, D.C., and spare parts .. 298,560

Fairchild Engine & Airplane Corp., Fairchild Aircraft Division, Hagerstown, Md.; airplanes and spare parts 4,746,951

Follansbee Steel Corp., Pittsburgh; terneplate, steel base, and tinned-plate, steel 5,426

Gardner-Denver Co., Washington; compressors, air and spare parts 13,832

General Cable Corp., Washington; cable 48,132

AWARDS

General Motors Corp., Cleveland Diesel Engine Div., Cleveland; sets, diesel, generator and spare parts 190,528
submarine engineering spare parts 14,330
propelling machinery and spare parts for submarine tenders ... 5,853,000
propelling machinery for fleet tugs 4,300,000

Hooven, Owens, Rentschler Co., Hamilton, Ohio; piston, piston rod, and piston cooling oil tube 7,040

Houde Engineering Corp., Buffalo; equipment for manufacture of aircraft parts 38,865

Independent Engineering Co., O'Fallon, Ill.; cylinders, acetylene .. 268,000

International Nickel Co., Inc., New York; nickel-copper-aluminum-alloy, rod, round 9,707
nickel, remelting 34,609

Intertype Corp., Brooklyn; machines, typesetting 21,744

Walter Kidde & Co., Inc., New York; extinguishers, fire, portable 114,532

Kirk & Blum Mfg. Co., Cincinnati; ovens, drying, gas and electric 8,744

Lapp Insulator Co., Inc., Le Roy, N. Y.; insulators 90,625

Thomas Laughlin Co., Portland, Maine; shackles, anchor screw pin 52,359

Lionel Corp., New York; compasses, ship 9,750

Maine Steel, Inc., S. Portland, Maine; shackles 14,911

McKay Co., Pittsburgh; chains and fittings, various 117,386

Mercury Mfg. Co., Chicago; trucks, fork, electrically operated 19,863

Midvale Co., Washington; steel, tool, carbon 28,715

Morton Mfg. Co., Muskegon Heights, Mich.; machine, horizontal, boring, drilling and milling 72,675

National Cash Register Co., Dayton, Ohio; ordnance equipment. 1,490,760

National Tube Co., Pittsburgh; ordnance equipment 1,175,000

Okonite Co., Passaic, N. J.; cable, electric 13,340

Porcelain Products, Inc., Parkersburg, W. Va.; insulators 29,032

John A. Roebling's Sons Co., Trenton, N. J.; thimbles, steel, galvanized, wire rope 37,017
cable, steel, carbon 86,000

L. L. Rowe Co., Boston; aluminum castings 8,257

Ryan Aeronautical Co., San Diego, Cal.; airplanes and spare parts. 4,134,205

Sight Light Corp., Deep River, Conn.; lanterns, electric, portable 71,455

Silent Hoist Winch & Crane Co., Brooklyn; capstans, mooring, motor-driven 67,502

Standard Steel Works, Division of Baldwin Locomotive Works, Philadelphia; shafts, propellor, steel, rough 10,715

Troy Chain Co., Inc., New York; chains and fittings, various ... 30,422

Tuthill & Co., Inc., Agents, Tin Sales Office, Netherlands Indies Govt., New York; tin, pig, grade A 290,500

United Transformer Corp., New York; equipment, rectifier 21,487

Wadell Engineering Co., Newark; fixtures, rod-boring, hand operated 26,713

Welsh Mfg. Co., Providence; screw drivers, jewelers, in sets 9,308

Westinghouse Elec. Supply Co., Washington; insulators 79,064

Westinghouse Elec. & Mfg. Co., Washington; turbine, gear, bed plate, etc. 21,833

Worthington Pump & Machinery Corp., Washington; pumps, centrifugal type, motor-driven ... 48,795
pumps, fire and controller 35,302

Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia; trucks, crane, high lift	155,610

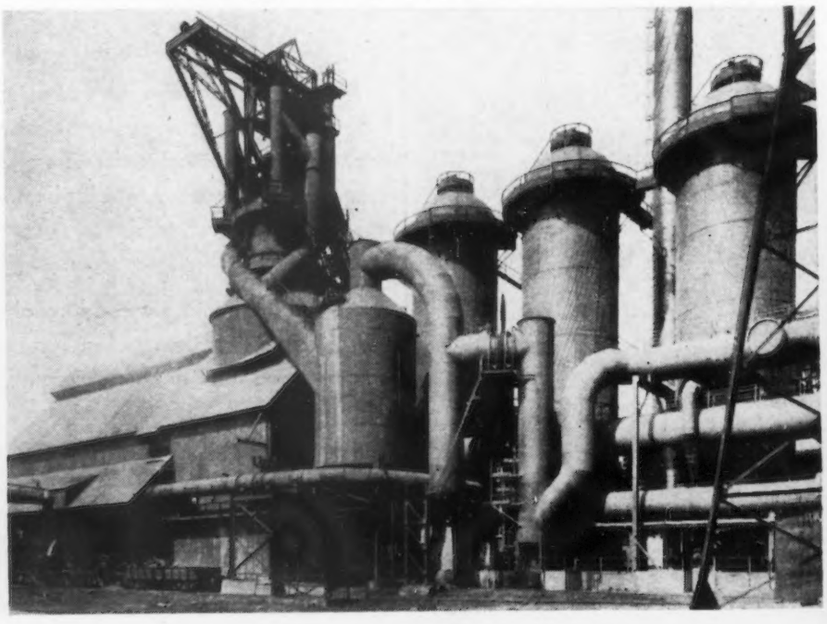
War Dept., Ordnance:

Allegheny Ludlum Steel Corp., Brackenridge, Pa.; gages	$10,110
American Shim Steel Co., New Kensington, Pa.; strip steel	152,445
Bendix Aviation Corp., Bendix Products Division, South Bend, Ind.; parts for carburetor	21,309
Breeze Corp., Inc., Newark, N. J.; parts for ignition assembly and engine starters	11,417
Brown & Sharpe Mfg. Co., Providence, R. I.; tools and pumps	6,786
General Steel Products Corp., Long Island City, N. Y.; bays	13,183
Gilbert & Barker Mfg. Co., West Springfield, Mass.; assemblies	39,754
Heald Machine Co., Worcester, Mass.; machines, boring	33,547
Hendey Machine Co., Torrington, Conn.; lathes	18,404
Heppenstall Co., Bridgeport; steel, die block	7,603
Kilgore Mfg. Co., Westerville, Ohio; igniting fuze	40,617
Lincoln Park Tool & Gage Co., Lincoln Park, Mich.; gages	15,689
Logansport Machine, Inc., Logansport, Ind.; presses, hydraulic	18,160
McKiernan-Terry Corp., Dover, N. J.; staking machines	26,720
Majestic Tool & Mfg. Co., Detroit; supports for drilling machines	6,000
Metalweld, Inc., Philadelphia; pickling and washing units	14,980
Modern Machine Tool & Die Co., Bridgeport; dies	33,600
Norton Co., Philadelphia; wheels, resinoid bonded	5,651
Precision Mfg. Co., Philadelphia; gages	7,578
Republic Steel Corp., Steel & Tubes Division, Cleveland; casings	
Vinco Corp., Detroit; gages	24,548
Wiedemann Machine Co., Philadelphia; gages	14,452
York Safe & Lock Co., York, Pa.; proof testing guns	69,915
Zimmerman Steel Co., Bettendorf, Iowa; steel castings	7,019

War Dept., Other Agencies:

Aermotor Co., Inc., Chicago; triangulation towers	$7,220
Allegheny Ludlum Steel Corp., West Leechburg, Pa.; steel, strip	52,992
American Brass Co., Kenosha, Wis.; disks, cartridge, brass	246,951
American Car & Foundry Co., Berwick, Pa.; parts for tanks	19,768
American Steel & Wire Co., Cyclone Fence Division, Los Angeles; fencing materials	25,454
Babcock & Wilcox Tube Co., Beaver Falls, Pa.; tubing, seamless steel	6,067
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J.; parts for tanks	97,792
Buffalo - Springfield Roller Co., Springfield, Ohio; rollers	8,114
Caterpillar Tractor Co., Peoria, Ill.; tractors and graders	30,751
Colt's Patent Fire Arms Mfg. Co., Hartford; machine guns	50,350
Detroit Tap & Tool Co., Detroit; gages	6,541
Charles Fischer Spring Co., Brooklyn; assemblies for rifle	50,396
Foote Construction Co., New York; steel sheet piling	7,428

ALL-WELDED SHELL: The shell of this recently rebuilt blast furnace at Bethlehem Steel Co.'s Steelton plant, Steelton, Pa., is of all-welded construction. Hearth diameter was increased from 16 ft. to 18 ft. The bosh diameter is 22 ft. 6 in., the height 88 ft. 2 in., and the furnace has a rated capacity of 667 tons per day. The three stoves which are 24 x 100 ft. high each have 191,000 sq. ft. of heating surface. The new shell, which was fabricated in seven rings varying in height from 6 ft. 1½ in. to 10 ft. 1½ in., was supported during construction by attaching it at two points to the old construction. The first ring was welded to the mantle plate angle outside of the old shell, the successive rings erected and welded on the outside, the 7th ring attached to the upper ring of the old shell, after which the remaining rings of the old shell were removed and the welding on the inside of the new shell completed. There was practically no movement of the top when the load was transferred from the old to the new shell.



Northern HI-LIFT HOISTS

serve manufacturing, storage and shipping operations at less cost

The combination of unusual flexibility, exceptional ease of control and high economy gives the Hi-Lift Hoist a wide usefulness. Sturdy construction makes it always reliable.

The load, large or small, is under the accurate control of the operator. He can lift, carry and spot with precision.

Hi-Lift Hoists are in use in every type of industry—steel mills, automobile plants, foundries, machine shops, tool and die shops, paper mills, structural plants, power plants and many other places.

They are handling dies, castings, machinery, steel, paper, electrical material, automobile bodies and frames, lumber, stone, pipe, etc., at amazingly low costs, and with the high-lift feature are making better use of building space.

The Hi-Lift line is comprehensive —there is an economical unit to meet YOUR needs.

NORTHERN ENGINEERING WORKS
2607 Atwater Street
Detroit, Michigan

Typical Installations of Northern Hi-Lift Hoists In Various Industries

Fulton Sylphon Co., Knoxville, Tenn.; fuze 60,900
General Electric Co., Federal & Marine Department, Schenectady, N. Y.; gages 5,800
General Excavator Co., Marion, Ohio; cranes and spare parts .. 148,653
General Motors Corp., Chevrolet Division, Detroit; trucks, panel delivery 23,523
Giles & Ransome, Cape Henlopen, Del.; diesel tractor and bull-dozer 9,275
Great Lakes Steel Corp., Detroit; steel, cold rolled 22,358
Hansen-Whitney Machine Co., Hartford; gages 18,014
Hermance Machine Co., Williamsport, Pa.; ripsaws 6,988
Irving Subway Grating Co., Inc., Long Island City, N. Y.; airplane landing matting and tools 399,455
F. J. Jacobs Co., Detroit; fuze .. 424,800
King Machine Tool Co., Cincinnati; mills, boring 50,980
Knox Stove Works, Knoxville, Tenn.; griddles, cast iron 66,820
F. S. Land Mfg. Co., Seattle; oil fired ranges 8,752
Maine Steel, Inc., South Portland, Me.; anchors 50,265
Master Electric Co., Dayton, Ohio; motors, generator 85,901
William O. McKay Co., Seattle; Ford trucks 30,148
Meili-Blumberg Corp., New Holstein, Wis.; trailers 18,148
Metal Craft Mfg. Co., New York; steel washers 5,747
H. K. Metal Craft Mfg. Corp., New York; card holders 6,054
Metallurgical Products, Inc., Shreveport, La.; facilities for production of powdered iron carbonyl 125,000
New York, New Haven & Hartford Railroad Co., New Haven, Conn.; railroad track equipment 8,359
Niles-Bement-Pond Co., Pratt & Whitney Div., West Hartford; gages, pipe 196,850
Northern Commercial Co., Seattle; motor grader 5,660
Okonite Co., Wilkes-Barre; cable, copper 19,770
D. W. Onan & Sons, Minneapolis, Minn.; generator sets, portable. 49,490
Osgood Co., Marion, Ohio; shovels 171,054
Phillips-Drucker, St. Louis; centrifuges 18,160
Pullman Standard Car Mfg. Co., Chicago; facilities for manufacturing aircraft parts 1,108,901
Quincy Compressor Co., Quincy, Ill.; compressors 68,917
Republic Steel Corp., Berger Mfg. Div., Canton, Ohio; boces and racks 81,439
Revere Copper & Brass, Inc., Rome, N. Y.; disks, cartridge, brass 79,730
Herman F. Ritz, Lancaster, Pa.; theodolites 22,200
Joseph T. Ryerson & Son, Inc., Chicago; seamless steel tubing. 95,826
J. G. Saltzman, Inc., New York; aero-photo enlargers 7,020
Scanlan-Morris Co., Madison, Wis.; sterilizers 5,750
J. Sklar Mfg. Co., Long Island; surgical instruments 93,792
United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford; spare parts for engines 222,547
Union Steel Castings Division, Blaw Knox Co., Pittsburgh; steel gun emplacements 34,000
Warren Pipe Co. of Mass., Inc., Phillipsburg, N. J.; cast iron water pipe and fittings 14,211
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.; gaging machines 10,600
Youngstown Sheet & Tube Co., Youngstown; steel, hot rolled .. 11,755
Zarkin Machine Co., Inc., New York; grainers, plate 5,190

Lathe Accuracy Approved as Defense Emergency Standard

• • • **The American Standards Association** has announced the approval of its first Emergency Defense Standard. The new standard, which is for the machine tool industry, sets up accuracy requirements for lathes. It describes a series of tests to be applied for checking engine lathes in respect to such matters as bed level; tailstock way alinement; spindle center runout; lead screw alinement; and in turning the work cylindrical when mounted in chuck or between centers. The accuracy requirements stated in terms of maximum permissible variations apply to three groups of engine lathes: toolroom lathes; engine lathes from 12 to 18 in. swing, and engine lathes from 20 to 36 in. swing.

The requirements for accuracy of engine lathes originated with the National Machine Tool Builders Association. Shortly after the ASA had adopted its emergency procedure, the NMTBA asked that this be applied to the proposed standard to expedite its approval and publication.

"Accuracy of Engine Lathes" will be published soon and copies will be available through the American Standards Association, 29 West 39th Street, New York.

United Engineering Vandergrift Strike Ends

Pittsburgh

• • • **United Engineering** & Foundry Co.'s Vandegrift, Pa. plant, following a three-day strike shutdown, was back to full production this week on heavy armament castings, pending outcome of a conference to be held in Washington between the National Defense Mediation Board and representatives of the SWOC.

The strike, which involved 700 employees, was occasioned by the collapse of contract renewal negotiations and expiration of the old agreement. The union had demanded exclusive bargaining rights, whereas the company refused to concede this point but indicated they were willing to sign a contract similar to the U. S Steel agreement which is on behalf of union employees only.

175,000 Seen Employed In Coast Plane Plants

• • • **At peak production** of war aircraft, 175,000 wage-earners will be turning out planes on the Pacific Coast, the Aeronautical Chamber of Commerce of America estimates. During the first quarter of 1941, ten Pacific plants, including nine airplane and one aircraft accessories firm, have added 19,309 employees, and nearly a million dollars to their weekly payrolls.

(Total warplanes produced last month totaled 1427, as against 1216 in March, 972 in February and 1131 in January, according to the Office of Production Management. Figures for the first three months included transport planes, many of them for military use.)

Temporary Shortage of Cobalt to Be Relieved Soon

• • • **Despite the increased use** of cobalt as an alloying element, in chemical and ceramic applications, no fear is felt over the possibility of a shortage in this material for the future.

While production of cobalt in the United States is negligible, stocks of imported material and small imports from Canada have helped to bridge the difficult period that began with the invasion of Belgium. Before the war the smelting and refining of cobalt was done mostly in that country by the Union Minière du Haut Katanga and the U. S. imported most of its requirements of cobalt metal and oxide from that source. The Belgian Congo produces a large part of the world's cobalt ore, the balance of the demand being supplied by Northern Rhodesia and Canada. Finnish and Moroccan deposits were important in the past. This

STEEL FOR BRITAIN: Symbolizing the American steel worker's aid for Britain, Donald B. Gillies, second from left, Republic Steel Corp. vice-president, is shown presenting a

country has tried to develop domestic sources of cobalt ore, but these efforts have not met with success so far. World production in 1938 was estimated at 4500 tons and at 6000 tons in 1939 by the U. S. Bureau of Mines. The United States consumed 1000 tons of imported cobalt in 1939 and 350 tons of cobalt oxide.

Big quantities of Congo ores have been imported and stocked at Niagara Falls, N. Y., where a large plant for the production of cobalt metal and oxide is now nearing completion; it is said that the plant will be in full operation by the end of June and that production from that plant and several smaller refining operations of Belgian ore in the United States will result in an ample supply of cobalt products for all requirements. During the last month or two several tool steel producers were allocating supplies of cobalt steel to the users because of a temporary shortage.

Cobalt is being used increasingly as an alloying element in the manufacture of high speed steel and of special carbides. It is also important because of its chemical and electro-plating applications and its use in the manufacture of ceramics and driers for paints, etc. The present time with increased industrial activity, therefore, will tend to accentuate the need for this strategic element.

Canadian Ford Co. Expands For Mechanized War Demand

• • • A **$1,500,000 expansion** of plant and manufacturing facilities of Ford Motor Co. of Canada, Ltd., has been announced by Wallace P. Campbell, president. The expansion, to be financed by the company itself, will meet mechanical transport demand.

stainless steel stockpot to a representative of the British War Relief Society in exchange for a vial of ashes which drifted under a relief society tea kitchen under fire in London.

Industrial Gear Sales Set New Record in April

• • • **Sales of industrial** gears set another new record in April, according to the American Gear Manufacturers' Association, which reports its sales index for the month at 292, as compared with 288 in March and 128 in April, 1940. For the four months ending with April of this year, the average index shows a gain of 130 per cent over the comparable 1940 period. Automotive gears and gears used in high speed turbine drives are not included in this index.

Awards Given For Most Beautiful Steel Bridges

• • • **The 13th Annual** awards for the most beautiful bridges built of steel during 1940 are announced by the American Institute of Steel Construction. They are: Most beautiful monumental bridge: Susquehanna River Bridge between Havre de Grace and Perryville, Md. Most beautiful medium-sized bridge: Dunnings Creek Bridge on the Pennsylvania Turnpike in Bedford Township, Pa. Most beautiful small bridge: Klamath River Bridge at Orleans, Cal. Most beautiful movable bridge: Oceanic Bridge over Navesink River between Locust Point and Rumson, N. J.

Pressed Steel Car to Increase Car Capacity

• • • **Pressed Steel Car Co., Inc.,** will increase its freight car capacity from 48 to 72 cars a day by the establishment of a third construction line, preparation for which is already under way and which is expected to be completed by July 15. Pressed Steel has not operated a third line since 1925.

It is believed that this move is an indication that the government will see that raw material needs are provided to freight car manufacturers for transportation equipment.

Government to Acquire 37,500-Ton Tin Reserve

• • • **A reserve of 37,500** tons of tin will be purchased at 50c. a lb., c.i.f., U. S. ports, during the six months beginning July 1 by the Metals Reserve Co., a federal agency, according to an agreement made with International Tin Co. If the production and export regulation scheme is extended, purchases will automatically continue after the six-month period.

Budd Co. Employees Get Second Wage Increase

• • • **Wage increases** ranging from 5 to 11 per cent were granted to 8500 employees of Edward G. Budd Mfg. Co. on Monday. This increase, which will add more than $1,000,000 a year to the company's payroll, is the second wage adjustment this year. The first was a 5 per cent boost announced in February.

Springfield, O., Short Of Skilled Workmen

• • • **Defense production** training plans are being boosted here in this industrial city of 71,000 population. The construction of a new building for technical education has become a lively project during the past week. With nearby cities such as Dayton and Columbus looking for thousands of workers, Springfield's only recourse is to train its own workers as speedily as possible.

Even tripling the number of machine shop trainees here would not fill all present requirements, according to A. M. Ansevin, of the principal employment bureau, who reports that much assistance in training is being given by Springfield High School, Wittenberg and Antioch Colleges and Ohio State University.

Idle metal-working capacity is scarce in Springfied. The local International Harvester Co. plant, employing around 4000 persons, holds large government orders for trucks. Robbins & Myers, employing around 2000 persons, has received well over $1,000,000 in government awards, including aerial bombs. Bauer Brothers is reported to have about $3,000,000 in direct contracts calling for artillery ammunition parts and Steel Products Engineering Co., Thompson Grinder Co., Springfield Brass, Buffalo-Springfield Roller Co., are all participating in the defense program. Steel Products Engineering Co. recently opened a new factory and office building, adding 30,000 sq. ft. to its space.

Wright and Patterson air fields, which are situated between Springfield and Dayton, have drawn many workers from this city.

About the only idle factory space here is a group of buildings formerly operated as a malleable iron foundry and adaptable for various types of heavy manufacturing. About 45,000 sq. ft. of floor space are available in five buildings of the plant, including a two-story office building.

2700 Republic Aviation Workers Waive Vacations

• • • **Waiving their summer** vacation in the interest of national defense, employees of Republic Aviation Corp., Farmingdale, N. Y., will work during the customary holiday period but will be paid an extra week's wages as a vacation bonus.

2000 Subcontractors In Rochester Area

• • • **One hundred and seventy prime contractors, aided by 2000 main subcontractors, are turning out contracts totaling $105,000,000 in the Rochester Ordnance District, according to Maj. Gen. Charles M. Wesson, the Army's chief of ordnance. In addition to main subcontractors, hundreds of other subcontractors turning out parts are not reflected in these figures.**

Strikes? Studebaker Officials and Union Prefer Way of Peace

South Bend, Ind.

• • • **Current and threatened** defense strikes are causing public opinion in many industrial areas to believe that labor unions do nothing but foment violence and disrupt the nation's vital defense program.

Here in South Bend, it's different, at least at the Studebaker Corp. plant where, for more than 85 years, a tradition of peaceful employer-employee relations have been built up.

Look at the record! Not a single strike since the UAW union was formed in 1933. And with a union contract so amenable to change at any time that you know there wouldn't really need to be a contract if the national union didn't insist upon it.

With cooperation of a sympathetic management, Studebaker Local No. 5 apparently has demonstrated that a union can be properly administered and be a beneficial representative of its members.

Studebaker's local charges only $1 a month dues. A new man doesn't pay initiation fees until he has been on the job nine months; for, as William Ogden, president, Local No. 5, UAW, says, "we don't want to take a man's money unless we're sure he's going to have a permanent job." The local has only one full time salaried officer—the financial secretary. All others, including the president, stay on at their jobs in the plant, all union officers being bonafide Studebaker workers, generally of long standing. Bill Ogden has been with the company 17 years, R. H. Berndt, financial secretary, for 13 years.

The executive board can't spend a dime of union money without approval vote of regular membership at the weekly meeting. At least 24 hr. before the meeting all bills are posted on the bulletin board. Books are audited every three months by the trustees and certified. Important elections are conducted on the county's voting machines. For use of these, the union pays $50 rental, plus insurance, plus the salary of the same man who locks and unlocks the

machines on regular county voting days. Any union member can see the vote totals on the machines if he so desires. No one can vote without a dues receipt—so members of Local No. 5 have never had cause to doubt the honesty of their elections.

The company grants the union the right to the time of 30 full time workers if desired—and seniority for the 30 would be maintained. But the union seldom uses more than two or three. Instead, an officer can leave the job to handle an important union matter. If he leaves, he stamps his time card "out" and the union—not the company—then pays him for his time. When the bargaining committee meets with management, each member temporarily leaves his job and gets his wages from the union while the bargaining proceeds. The company is willing to pay the committee but the union prefers the other way.

First time collective bargaining was held at Studebaker in 1934 when a committee called on Harold S. Vance, Studebaker chairman, accompanied by a lawyer and a national union officer. Mr. Vance told the group the company was always ready to discuss any problem with responsible groups representing the employees, and hoped that these discussions would be held on a basis of mutual confidence. Since the first meeting, no one but Studebaker workmen and Studebaker executives has ever sat at the negotiators' table. No claimant to the right to represent a body of workers has ever been challenged. Time was permitted to prove the justice of his claim.

The union has plant-wide seniority. A man laid off in one department can be placed in another, a movement which can continue until the youngest man in point of service is laid off. Thus every man knows his seniority is something to treasure. Such a practice calls for complete cooperation from management and it is given.

Actually, seniority at Studebaker is a fact based on the "father and son" tradition long encouraged. Hundreds of fathers have trained their own sons on the job. Which explains why the average age of Studebaker workmen is 43.81 years—an industry high.

Membership is practically 100 per cent among the more than 7500 Studebaker employees. Out of the $1 monthly dues come contributions to state and national CIO organizations, along with funds for educational, sick leave and other programs. Yet, Local No. 5 is paying for its own modern building. It will soon build a sizable auditorium in its headquarters. It has outlined a handsome building program and is taking it slowly, biting off only as much as it can financially chew. Other union locals affiliated with South Bend plants rent meeting rooms from Local No. 5. But these locals have to maintain certain standards. "We've cancelled permits several times on locals with Communists in their ranks," says president Ogden. "We told them they'd have to clean house if they wanted to use our building."

Studebaker Local No. 5 has proven that a union can serve its members advantageously and still be cooperative with management. In fact, as one official says, "we couldn't do the things we do without the help of management. When we sit down to talk things over, we know we're all working together; we call each other by our first name; and each party trusts the other."

Studebaker has long been known for its fine employee relations, dating from the time J. M. Studebaker joined his brothers Henry and Clem in 1858 in the brothers' blacksmith and wagon building shop. Studebaker has one of the first industrial relations departments. It operates without form rules or methods but deals humanly with each problem, always respecting a workman's inherent human dignity. The contract between union and company written in 1937 without legal aid has not been rewritten. It has been amended 11 times—whenever either side thought something should be done to meet new conditions. No lawyer has ever seen the contract.

Perhaps the success of relations at the Studebaker plant can be summarized in Chairman Vance's attitude toward union organization: "Labor unions are not a transient movement. They are here to stay. It's up to business to make up its mind to work with them, and help them establish themselves on a firm basis so that all concerned can benefit."

Stove Makers Union Ready To Celebrate 50 Strikeless Years

• • • The Manufacturers Protective and Development Association, an organization of 38 American stove manufacturers and the AFL International Molders & Foundry Workers Union of America will hold a golden jubilee here on May 29.

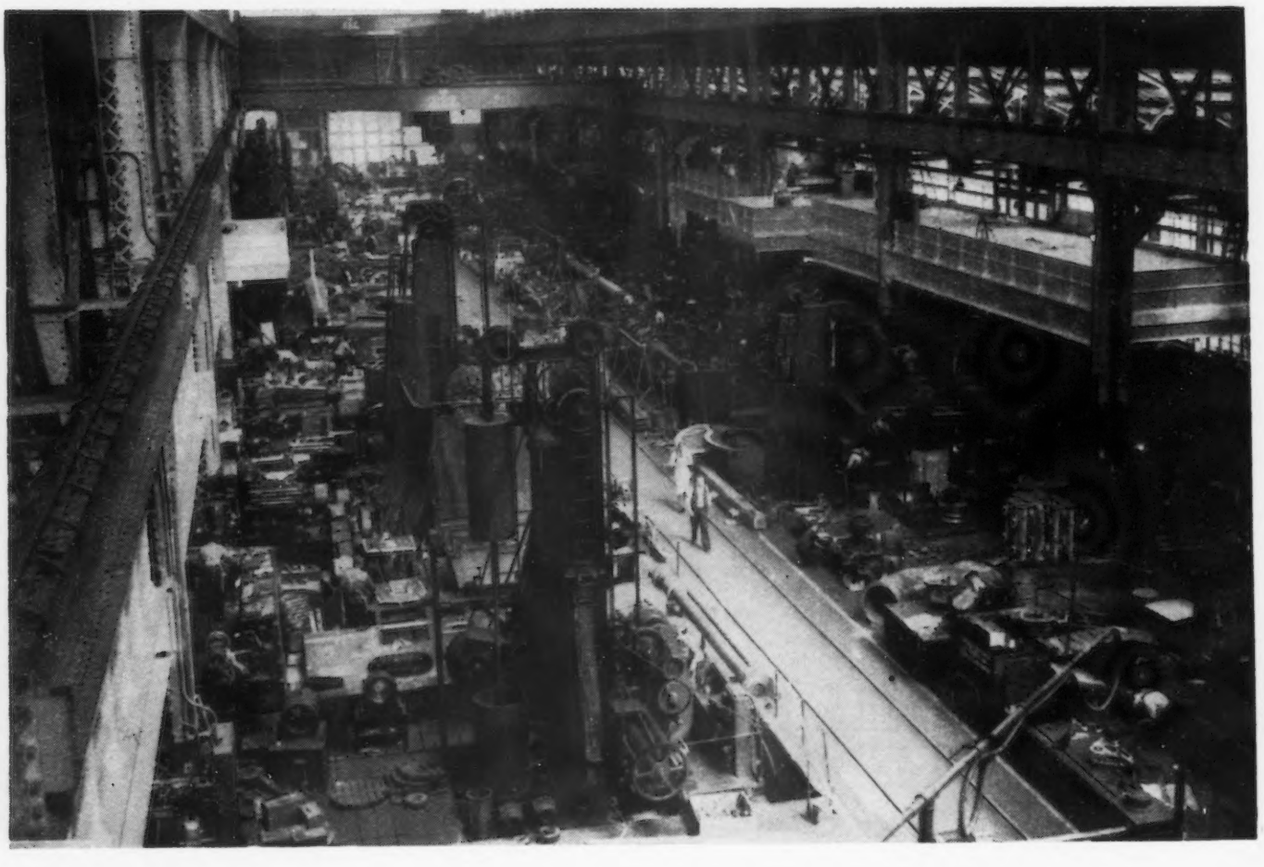
The two organizations will celebrate 50 strikeless years among 25,000 organized workers in the stove industry, a record which began in 1891 when the stove companies first bargained collectively with the union.

Said James Mitchell, national treasurer of the employers' association, "We have our own voluntary cooling-off period and it works every time." George Hass, business agent for the union says, "Both sides have been fair with each other. When you have fairness, you don't have trouble. That's all."

SELF-SUPPORTING STACK: This self-supporting stack, 4 ft. 6 in. by 100 ft., was manufactured by Wyatt Metal & Boiler Works' Houston, Texas, plant for a Gulf Coast refinery.

Photos by Harris & Ewing and Globe

TANKS, SHIPS OR PLANES: Which of these instruments of war does the U. S. need most? Should steel plate output be diverted more to tanks than to ships? Such questions require early answering. Meanwhile, operations at the Chrysler tank plant, top, and the seldom-photographed Brooklyn Navy Yard machine shop, below, are being pushed at top speed.



Jesse Jones Opposes Wide Steel Expansion

• • • **Contributing to conflicting** views within the Administration on an endlessly-discussed subject, Federal Loan Administrator Jesse H. Jones at a press conference last Friday tossed a wet blanket over the idea of broad addition to the country's steel-making capacity. Thus he lined himself up with OPM Director General William S. Knudsen. By the same token he lined himself up against some OPM expansionists and prominent New Dealers, including Price Administrator Leon Henderson.

Not only did Mr. Jones go on record against wide-scale steel expansion, though conceding "bolstering here and there on particular kinds of steel" may be necessary, but he suggested that the problem be left to private steel interests rather than to be underwritten by the government. This observation led to the belief that Mr. Jones, in the face of the situation as presented so far, is opposed to a loan by RFC's subsidiary, the Defense Plant Corp., for the currently proposed Pacific Coast plant, plans for which have been only vaguely outlined. Sponsoring the plan is Henry J. Kaiser, West Coast builder.

When asked if he had anything to say about increasing steel capacity, Mr. Jones replied that RFC and OPM are considering the question, but added that it is doubtful if any overall steel capacity expansion is needed.

"There might have to be bolstering up here and there on particular kinds of steel," Mr. Jones stated. "That in all probability can be done at existing steel plants throughout the country."

Concerning the need of additional capacity on the Pacific Coast, Mr. Jones said that this subject is also receiving consideration, but that the Bethlehem Steel Co. and the United States Steel Corp. have plants there and "it may be that some standby capacity at or near the Pacific Coast may be needed."

Mr. Jones added that Gano Dunn, senior consultant of OPM's Production Division "is in this thing and I don't want to say too much, but generally speaking no additional overall capacity is needed."

Asked if Mr. Kaiser had asked for an RFC loan, Mr. Jones replied that Mr. Kaiser had spoken informally about a steel plant on the Pacific Coast but that there has been no formal move in that connection.

"There is not yet enough progress in any steel plant proposed to be built by Mr. Kaiser to give it serious discussion," Mr. Jones declared. "My own thought is that the men already in the steel business know their business and can much more soundly supply any needed capacity by adding a little here and there. The steel people already on the Pacific Coast would naturally want to figure on supplying any proposed increase in capacity there."

VISITOR FROM PARAGUAY: John L. Perry, president of Carnegie-Illinois Steel Corp., greets Commander Ramon Diaz Benza, chief of the naval general staff of Paraguay, during a tour of Pittsburgh district plants by officials of Latin-American navies.

Work Begun on New Steel Plant in S. A.

Pittsburgh

• • • **Work has been started** on the new steel plant in Brazil, it was learned last week when naval general staffs of the Latin American republics visited Pittsburgh during a tour of defense centers in the United States. The plant will be operated by a company to be known as the National Steel Co. of Brazil.

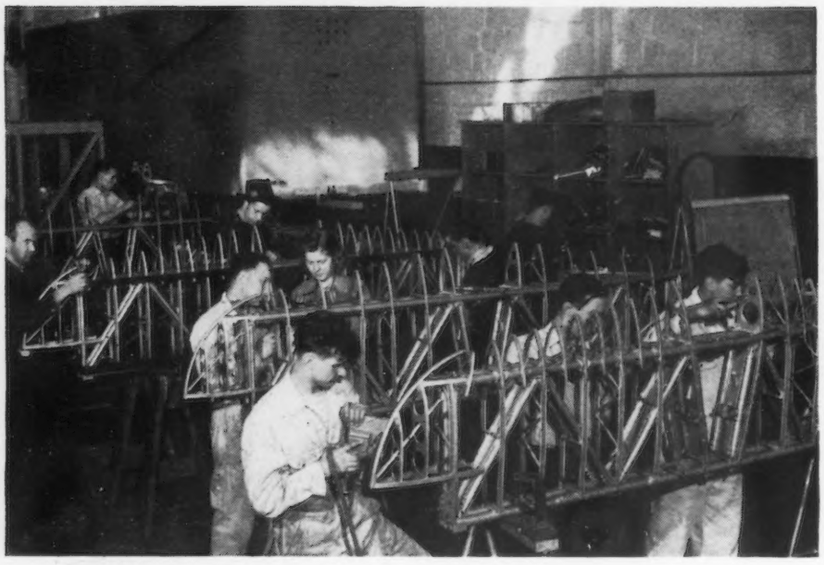
The construction of this mill, which is under the supervision of the Arthur G. McKee & Co., of Cleveland, will require approximately four years, it is understood. Designs of the mill have been completed and part of the machinery has been purchased. This is the project for which the Export Import Bank furnished $20,000,000, the balance to be made up by capital raised in Brazil.

The leading naval chiefs of South America on their stop here visited the Carnegie-Illinois Steel Corp. Homestead armor plate plant and witnessed the pouring of a 275,000-lb. ingot for forging into armor plate. The party visited the press shop where a 263,000-lb. ingot was being forged into armor plate.

The South American naval officers, with United States Navy officials and leading Pittsburgh executives, were shown material which is being fabricated for the latest naval shipbuilding programs. Actual forging operations, heat treatment, and finishing technique of armor plate steel was witnessed for the first time by the assembled guests. A partly finished turret port-plate for the 35,000-ton battleship Indiana was among the various work projects on display.

Steel on Ration Cards in France

• • • **All users of steel** in Vichy France have been given coupons to represent quantities of steel from 1 kg. to 50 tons. These quota coupons are passed on to the supplier of the material. Only indispensable requirements will be authorized, permitting control of steel along the line from user to producer.



15 HURRICANES A WEEK: Not all the planes for British and U. S. defense are being made in Britain and the U. S. In a plant at Fort William, Ont., the Dominion is producing 15 Hurricane fighter planes weekly. The top photograph shows a young woman working on the tail plane assembly line in the Hurricane factory. In the center, a workman at the right has placed a roller bearing in a section of plane tubing and is listening for possible defects as it rolls through. Final assembly of tail planes at the Hurricane plant is shown below.

Steel Warehousemen Told Rougher Times Due in Labor Market

San Francisco

• • • **Labor cannot use** a steeply rising cost of living as an excuse for higher wage demands in the current situation, so it is substituting the declaration of an inherent right to share in business profits, Almon E. Roth, president, San Francisco Employers' Council, told the 32nd annual convention of the American Steel Warehouse Association here last week.

"Up until six weeks ago we had had fewer strikes in this country than in the comparable war period in 1915 principally because the cost of living hadn't risen sharply as it did prior to the last war," the Coast employer organizer told the delegates. "Labor has always used a rising cost of living as a springboard to higher wages.

"It can't use that excuse now, so it is substituting declaration of a right to share war profits. Labor does not take into account the necessity for building up capital reserves to see us through the emergency after the war, a time when labor union membership itself will suffer unless business is in a healthy condition. Nor does labor take into account that stockholders have had little return on their capital for many years.

"Locally and nationally we're in for rougher times in the labor market. The better wages and working conditions get, the less need there is for unions unless

the leaders can find something more to ask for. In order to keep their jobs, labor leaders have to find new demands, and then they have to get these demands or make trouble. In the present situation, labor will probably ask an increasing voice in management and in the determination of industry practices.

"From one standpoint, labor now is in a favorable position to enforce its demands with the labor market characterized by scarcity. Labor unions now have about 8,000,000 members compared with 2,300,000 in the last war. Unions are able to control more votes, and are in a more favorable position with the government. Those fellows feel their oats, that they're sitting next to the great white father—and incidentally the seat is getting hot for the great white father now.

"On the other hand, employers never have had a better time to carry their case to the public than right now. The best way to stand up against labor unions is to say no, say it collectively, and mean it when you say it."

Speaking on "The Immediate Future in Alloys," F. W. Krebs, Super Steels, Inc., Cleveland, predicted a tendency toward lower manganese content in steel.

"So long as ship lanes are kept open to India, Africa and Brazil, there will probably be little development of our own low grade uneconomical ores. The tendency, however, will be toward lower manganese contents except where manganese is used to displace an element such as nickel or chromium."

He also foresaw a decrease in tin coatings, with more and more substitutes being developed for metal containers, such as an extension of refrigeration and freezing for the preservation of perishable foods.

"Tungsten carbide cutting tools will probably consume 25,000 lb. of tungsten per month during our defense program. This demand is as great as the entire consumption of 1938, but each pound of tungsten used in such tools is reported to free around 100 lb. of tungsten for other purposes. Molybdenum can replace much tungsten in high speed steels. A wider use of carbon manganese molybdenum steel will result if it is necessary to conserve chromium."

Discussing priorities on nickel steels, Mr. Krebs stated that many defense specifications can be changed to eliminate nickel steels.

"There do not appear to be engineering, metallurgical, or production problems which preclude the use of the cheaper and more readily obtainable steel," he said. "The machine tool industry can use steels other than nickel bearing."

"In regulating the purchase and sale of nickel steels by warehouses, the Division of Priorities has recognized the essential services which our industry provides. After attending a meeting at Washington I was convinced that the requirements of the warehouse industry in relation to its position in serving defense and now defense demands for steel products would receive equitable treatment when other priorities may be necessary. Full compliance with the present order should govern the conduct of our business."

A letter was read before the convention from E. M. Hopkins, chairman of the Minerals and Metals group of the priorities division of the OPM, indicating that the nickel steel priorities pattern may be followed closely when priorities are necessary on other products. The order gives definite recognition to the necessity of warehouse stocks in the distribution of steel, Mr. Hopkins' letter stated. Such stocks are necessary for emergency orders and for relieving the mills of small orders, the letter continues.

"The policy of control of stocks cannot be administered in the dark," Mr. Hopkins wrote. "We need information on stocks."

In discussing "Production and Distribution of Steel and the Public Interest," Edward L. Ryerson, Jr., chairman, Inland Steel Co., declared that an excellent opportunity exists to enlighten the public regarding the value of the steel industry in peace or war.

"Large numbers of people believe even now that 60, 70, or 80 per cent went into war requirements in the World War," he stated. He then referred to late estimates of government economists that 98,000,000 tons of ingots would be needed to supply 1942 requirements, of which only 28 to 30 million tons would be required for military demands.

The steel industry will be pinched to pursue a war program and fulfill normal demands, Mr. Ryerson declared, but also recalled TNEC rebukes to the industry two years ago for "over expansion."

Richmond Lewis, retiring president of the Association, asserted that business "is just beginning to feel the first effects and to see the implications of the huge defense program."

"What the coming years will hold for us, we cannot anticipate," Lewis said, "but I am sure we as an industry are desirous of contributing all we possibly can to further the interests and objectives of our government in attaining the production for defense which is vital to our security."

He urged cooperation of members in answering questionnaires to procure information on volume and inventories for the OPM.

"I am sure you will agree that it is far better that the association

Ford Instrument Local Offers Week of 60 hr.

• • • CIO members employed at the Ford Instrument Co. plant, Long Island City, N. Y., have notified the management that, as evidence of their willingness to make "any reasonable sacrifice" for national defense, they are ready to work 60 hr. a week to relieve a shortage of skilled precision mechanics. Two hundred of the plant's workers are on a 60-hr. schedule and most of the 1300 other employees, now working 48 hr., expect to be asked to put in longer hours as soon as additional machinery is obtained. A complete 60-hr. program would enable the same number of workers to turn out 25 per cent more work.

Frank Craig, president of the United Instrument Workers, local 425 of the United Electrical, Radio and Machine Workers of America, which has an agreement covering all the plant's employees, said that most of the workers were so tired from the strain of putting in long hours at precision machines that the money would prove no incentive were it not for their recognition of the urgency of the defense program.

as a whole be allowed to furnish figures for the industry than to have each individual company furnish such information to the government," he stated.

E. H. McGinnis, general manager of Union Hardware & Metal Co., Los Angeles, emphasized the need for business to make plans for the future, particularly for the years which will follow the war, and urged the business leaders to cooperate among themselves in working out their common problems under the present defense program.

"It is the business man who must accept leadership today, for it is the system of free enterprise which must make the United States an arsenal of democracy and it is the business executive who will be called upon to supply common sense and the guidance in the years to come."

Other speakers were Charles S. Dickerson, general manager of sales, Edgar T. Ward's Sons Co., who discussed "Association Values", and Norman Foy, general manager of sales, Republic Steel Corp. Mr. Foy dealt with steel specifications under present conditions.

Directors of the association elected Walter S. Doxsey, former executive secretary, as president for the coming year. Mr. Doxsey will continue active managerial duties. Vice-presidents will be E. D. Graff, Joseph T. Ryerson & Son, Inc., Chicago, and C. H. Bradley, W. J. Holliday & Co., Indianapolis. A. W. Herron, Jr., Jones & Laughlin Steel Corp., Pittsburgh, will be treasurer.

The executive committee includes Guy P. Bible, Horace T. Potts Co., Philadelphia; Lester Brion, Peter A. Frasse & Co., Inc., New York; A. C. Castle, A. M. Castle & Co., Chicago; A. O. Fulton, Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.; Charles Heggie, Scully Steel Products Co., Chicago; E. Jungquist, Percival Steel & Supply Co., Los Angeles; Richmond Lewis, Charles C. Lewis Co., Springfield, Mass.; E. L. Parker, Edgar T. Ward's Sons Co., Pittsburgh; J. F. Rogers, Beals McCarthy & Rogers, Buffalo; I. W. Tull, J. M. Tull Metal & Supply Co., Atlanta.

. . . To The Editor . . .

Cartoon

We recently had something quite humorous in our shop and we thought you might be interested in using it for one of your "Bull-of-the-Woods" comic strips.

A bar of steel was delivered to our factory several weeks ago and one of the factory "wits" chalked the word "hot" on that piece of steel. That chunk of metal absolutely stayed in the same position on the center of the floor for two weeks before someone caught on to the joke.

I would like to take this opportunity to tell you how much all of us enjoy your comic feature. It often appears on the bulletin board in our shop.

—R. L. Manegold,
Dings Magnetic Separator Co., Milwaukee.

Hitler

Your invoice for 1941 and your invitation to make use of your information facilities have just come to hand. After the second re-election of Franklin D. Roosevelt, the attitude in your leading articles has become openly hostile towards Germany and absolutely devoid of objectivity, so that we could not think of continuing to subscribe to your journal.

This being so, we fail to comprehend the reasons which have induced you to invite us to renew our subscription. Heil Hitler!

—Ruhrstahl Aktiengesellscaft,
Heinrichshütte, Hattingen-Ruhr, Ger.

Expansion

I wish to call your attention to erroneous information appearing in the May 1 issue of your magazine, "Iron Age." The article appears on page 66 under the heading "On The West Coast," subdivision "Niles plant to be expanded." A reference is made to operating changes, including the addition of "one" new furnace. This should have been four (4) new furnaces.

Inasmuch as more complete, correct information could be supplied you by proper request to informed individuals, we believe that it would behoove you to contact officials of our company when you desire information.

—Joseph Eastwood, president,
Pacific States Steel Corp., Niles, Cal.

Iraq

In The Iron Age which I received this morning, I noticed the photograph, page 83, entitled "Dawn in Georgia," and so I thought you might be interested in the attached photograph which might be entitled "Sunset in Iraq."

Incidentally, this shows a most ancient method of transportation together with the most modern method of transportation in the foreground. This picture was actually taken on the Iraq petroleum line of which we are reading so much in the papers at this time.

—A. F. Davis, vice-president,
Lincoln Electric Co., Cleveland.

$60,000,000 to Be Spent for Canadian Aluminum Expansion

Montreal

• • • **R. E. Powell,** president of Aluminum Company of Canada, Ltd., said that the Metals Reserve Corp., of Washington, has placed an order with the Canadian company for $63,000,000 worth of aluminum. Mr. Powell said that this big order will require important expansion of the company's facilities, most of which will be undertaken at plants in Quebec at a cost of about $60,000,000. This transaction will not interfere with production of aluminum which the company has contracted to supply British Empire countries. Recently Mr. Powell said that the company was then producing enough aluminum in Canada to build 50,000 airplanes a year.

Bill Would Enable RFC To Acquire Rail Equipment

• • • **Broad powers** through which the Reconstruction Finance Corp. could produce and acquire railroad equipment as well as other industrial facilities are contained in a defense financing bill passed by the Senate. Specifically, the Federal lending agency would be empowered "to produce, lease, purchase, or otherwise acquire railroad, equipment (including rolling stock), and commercial aircraft, and parts, equipment, facilities, and supplies necessary in connection with such railroad equipment and aircraft, and to lease, sell, or otherwise dispose of the same."

Foundry Equipment Orders Show Sharp Gain in April

Cleveland

• • • **Both repairs** and new purchases of foundry equipment showed sharp gains in April, according to the Foundry Equipment Manufacturers Association. The association's index of new equipment purchases rose to 405.3 in April from 329.3 in March, while the repair order index gained to 292.5 in April from 272.7 in the preceding month. Index covering total sales in April stands at 377.2, as compared with 315.2 in March and 285.3 in January.

Allocation Plan for Nickel Set Up by OPM

Washington

• • • **An allocation plan** providing industry-wide control over all supplies of nickel, formalizing and replacing the former mandatory control, was announced Monday by E. R. Stettinius, Jr., OPM Director of Priorities. Because of defense needs, supplies of nickel flowing into civilian channels will be drastically curtailed, Mr. Stettinius said.

Because of the shortage in nickel the new procedure does not include a schedule of preference ratings for civilian uses. However, some allocations, it was announced, can and will be made for non-defense uses on a restricted basis, in so far as possible, in order to prevent serious dislocations in established manufacturing plants and to prevent sudden unemployment.

Under the terms of the new order the Priorities Division will, month by month, make allocations of the available nickel supplies for defense purposes. All defense orders will take a rating of A-10 unless other ratings have been or may be assigned. During May approximately 15,500,000 lb. of nickel will be available in this country, almost all of it coming from Canada. This amount is the largest ever made available for industrial uses in this country in any one month.

Nickel Steel Substitutes Listed By Institute

• • • **To conserve nickel** and to aid consumers in making suitable substitutes for nickel steels, which have been placed under a system of priorities by the Office of Production Management, the American Iron and Steel Institute has prepared a booklet giving technical advice on alloy steels to be used as possible substitutes.

The booklet suggests as possible substitutes for nickel steels a wide variety of standard steels. In some cases of high nickel alloys, it suggests the substitution of alloys containing a lesser amount of nickel, together with such other alloying elements as molybdenum, chromium and vanadium. In other cases, nickel would be entirely supplanted by other alloys. By such substitutions, it is hoped that various nondefense industries whose supplies of nickel steel have been temporarily cut off or reduced may be enabled to continue production with a minimum of inconvenience or delay.

The booklet, which is called "Possible Substitutes for Nickel Steels," deals solely with constructional steels containing not more than the following percentages of the given alloying elements: nickel, 5.25; chromium, 1.50; molybdenum, 0.75; manganese, 2.00; silicon, 2.00 and vanadium, 0.20.

The effects of various quantities of those alloying elements on the engineering properties of steel have been explored and recorded systematically, thus making it possible to put into effect quickly a widespread program of substitutions in alloy steels.

To simplify the process of selecting suitable substitutes for nickel steels, numerous charts have been included in the booklet showing the comparable physical characteristics of standard alloy steels, including standard carburizing grades, thorough hardening steels, and low carbon alloy steels of low hardness value. The charts give such data as tensile strength, yield points, hardness and impact resistance.

Van Deventer Editorials Now Ready in Book Form

• • • **Thirty editorials** by J. H. Van Deventer, president and editor of THE IRON AGE, have been reprinted in a booklet (25c. a copy) now available at the publication's New York City office, 100 East 42nd Street. Widely quoted editorials are included.

Canadian Steel Plant to Increase Ingot Capacity

• • • **Dominion Steel & Coal Corp.** will expand its steel capacity at Sydney, Nova Scotia, by 670,000 gross tons yearly, and will expand capacity of its 110-in. mill there to 600,000 tons, the Canadian government announces. The government has signed a contract involving "several millions of dollars" providing for the expansion.

Stamping Capacity Open at Columbus

Columbus, Ohio

• • • **Subcontracts for the defense** program have been heavier here recently and are estimated now at a figure about equal to the $15,000,000 awarded here in direct contracts for manufactured articles. The figure does not include orders on which the new Curtis-Wright plant will work.

Plenty of stamping capacity still is open. Inquiries for screw machine production have been heavy but generally immediate acceptance of this class of work and quick deliveries are impossible to arrange.

In order to help land sub-contracts, the Columbus Chamber of Commerce has been contacting holders of defense contracts over the nation within a few days after awards are announced at Washington.

The new Curtiss-Wright plant which is 65 per cent completed, and already in partical production, is drawing upon available labor supplies deeply. The company is training hundreds of persons.

"Many of our industries at the present time are finding it impossible to obtain trained personnel which would make it possible for them to add additional shifts," says W. R. Bull of Columbus Chamber of Commerce. "Our local school system and other agencies are whipping into shape training programs in an effort to supply this needed personnel. Every possible effort is being made to supply these additional workers locally to eliminate the importation of personnel from other communities.

Wear Resistant Coatings Produced by Etching

(CONCLUDED FROM PAGE 47)

Particular care is taken so that the third tank or second rinse is free of solids or other contamination. It is contemplated, however, that in the future this initial cleaning will be accomplished in a vapor degreaser. The fourth tank in which the work is immersed contains caustic sulphide of 48 50 per cent concentration by weight, and solution temperature of 250 ± 5 deg. An excess of sulphur is maintained so that there is approximately 1 per cent more than is necessary to combine with all the iron present in the bath. Immersion in this caustic etch is for 15 min.

The fifth and last tank is a rinse tank and is held at a minimum temperature of 180 deg. Rinsing is a matter of 1 to 3 min. for the purpose of removing the excess caustic sulphide. Thereafter the liners are given a light coating of a rust-preventive compound in the bore.

From such investigations as have been made in the laboratory, the coating produced on the liner is ferrous oxide and ferrous sulphide tightly adhered to the unetched under layer of iron. When the liners are finish honed, they show a surface roughness of 1½ to 3½ micro-inch. After etching, the surfaces show a surface roughness in the order of 9-11 micro-inch. These figures would indicate that the order of surface attack is extremely superficial, being less than a few hundred thousandths of an inch. In appearance, the etched surface is a black matte surface having practically no reflectivity. In fact, even the fine hone marks which may be seen on the cylinder barrel under oblique lighting conditions cannot be discerned after the etching treatment.

In a paper* presented on this subject of wear resistant coatings by J. E. Jackson, also of the Caterpillar Tractor Co., certain engineering aspects of the treatment were brought out. It is Mr. Jackson's contention that since honing subjects the bore surface to deformation through metal removal as well as through flow by scratching, it is conclusive that the honed bore is coated with a thin layer of work-hardened metal, with the grains in random distribution. Run-in or surface conditioning orients the surface grains in the direction of reciprocation, but just as the strain-hardened metal layer produced by run-in resists future wear, so does the strain-hardened metal originally produced by honing tend to resist change of surface configuration by the run-in.

The methods by which chemical treatment makes the liner bore more susceptible to safe run-in are: By removal of the undesirable components of surface composition, by deposition of certain chemical end products, and by change in the surface configuration. When the layer of strain-hardened metal formed by honing is removed by etching, then the running-in process is greatly facilitated for the reason mentioned above. The honing action is also likely to loosen or distort some of the polyhedral grains of the cast iron, and these are either loosened or distorted in the matrix but not removed. These loosened grains, which may later cause scuffing by action of the piston rings, are among those undesirable elements to be removed by chemical treatment. Removal of free ferrite is another factor since it is the free ferrite that is the principal cause of one ferrous surface seizing or welding on to another.

But while the treatment does remove free ferrite, it does not attack the graphite particles of the cast iron and therefore beneficial effects of graphite become immediately available as a lubricant. When free ferrite and small grains of pearlite are etched by the solution, on the other hand, pits are formed which will be partly filled by the sulphide-oxide end products. These pits serve as reservoirs for oil and the matte surface of the coating facilitates rapid spreading of the lubricating oil and retains it in the porous inner structure of the coating as well. And when the temperature of a small surface area is caused to increase rapidly through deformation, sulphur from decomposed ferrous sulphide adjacent to the hot surface area will aid the oil in preventing welding. The superficial sulphide-oxide coating is removed during run-in, but the pits remain in the surface much longer. Thus, the surface conditioned coating will experience wear—but at a very low rate. As a small amount of the surface is worn away, a new layer of wear-resisting coating is formed with the next stroke of the piston.

* "Wear Resistant Coatings of Diesel Cylinder Liners," by J. E. Jackson, presented at the semi-annual meeting of the Society of Automotive Engineers, June, 1940, and published in the *SAE Journal*, January, 1941.

"Harmony In Industry" Topic For Detroit Engineering Group

• • • **"Prospects for Harmony in Industry"** will be discussed before the Engineering Society of Detroit on Friday, May 23, at 8 p. m. in General Motors Auditorium by Deloss Walker, editor and analyst of social and economical problems. Mr. Walker who has been a coal mining executive, educator, author, and co-founder and director of the National Recovery Crusade will attempt to answer the question: What is the function of government in the relation between employer and employee? Is the present policy sound? Should labor unions be incorporated? Should more responsibility be placed upon management in directing labor relations? What steps will improve understanding of their problems? Is management cooperating with labor? Should unions be responsible for the actions of their members? Is there a need for labor to exercise self-discipline? Should this be done by labor under the direction of management, or both?

The meeting is intended to be an open discussion of these and similar problems.

Industrial Truck Orders at High Level

• • • **April bookings** of electric industrial trucks and tractors, both in units and dollar value, continued at a high level, although somewhat lower than the peak established in February, the Industrial Truck Statistical Association, Chicago, reports. April bookings totaled 430 units as compared with 436 units in March. During the first four months of 1941 units booked totaled 1605 as compared with 392 during the same period in 1940, an increase of 309 per cent.

Total net value of chasses only was $1,472,225.80 during April, compared with $1,557,591.91 during March. During the first four months of 1941 the total value of bookings was $5,360,778.71 as compared with $1,362,023 during the same period of 1940, an increase of 293 per cent.

Details concerning April bookings follow: Thirty-one non-elevating platform trucks with capacities and base chasses prices ranging from 4000 to 6000 lb. and $1,770 to $3,225 respectively, had a total net value of $66,346.62. All net values are at factories, after additions and deductions for variations from standard specifications, trade in allowances, etc. when applicable. There were 356 cantilever trucks, with capacities and base prices ranging from 1000 to 20,000 lb. and $2,045 to $13,000 respectively, with a total net value of $1,249,799.44; 22 light and heavy duty tractors, base chasses prices ranging from $1,550—$1,745 had a total net value of $35,177.94; 21 crane trucks, with capacities and base chasses prices ranging from 3000 to 6000 lb. at 7 ft. radii and $4,780 to $7,450 respectively, had a total net value of $120,901.80.

The above figures are after adjustments for cancellations of 1941 bookings.

Girdler Turns Over Plane to Government

• • • The 14-passenger Lockheed Lodestar transport plane in which Tom M. Girdler, chairman of Republic Steel Corp., and other Republic officials travel on business trips has been taken over by the government, which is requesting, through the Office of Production Management, that all private owners of the two-engined, 1200 hp. model turn over their planes for defense. The Girdler plane was ten months old and had been converted to accommodate nine passengers.

New Guide For Steel Users

• • • **The 1941 Stock List** recently published by Joseph T. Ryerson & Son, Inc., is the largest and most complete steel buyer's guide ever published by that company. New products, new analyses, and new sizes plus an increased number of helpful charts and tables are included in the 268-page list. The book contains SAE standard specifications, a physical properties chart showing machinability of more than 50 steels, standard gage comparisons, weight tables, and other helpful data. Copies can be obtained on company letterheads.

Industrial Research Group Hears Cowan, of Republic

Pittsburgh

• • • **Market research** can be utilized as a pathfinder to guide chemists, industrial engineers and others engaged in technical research, Donald R. G. Cowan, manager of the commercial research division of Republic Steel Corp., told members of the Industrial Research Institute at their meeting, here May 16.

More than fifty research executives from leading industrial concerns attended this third annual meeting of the Institute, May 16 and 17.

"Market research can determine the potential size of the market for a new product," Mr. Cowan said, "thereby giving guidance on whether it is worthwhile to invest in the technical development of a product, and later, in plant facilities adequate to supply the market but not larger than necessary for reasonable growth."

He pointed out that most corporations at sometime or other have plunged into the production of new or improved products for which the market proved unexpectedly small, or which required unforeseen expenditures to establish them in competition with other products.

German Heavy Industries Earn Still Higher Profits

London

• • • **German heavy industries** are making vast profits from the production of supplies for the Nazi war machine. Annual reports clearly indicate that any company working on government contracts increased its profits substantially. The Vereinigte Stahlwerke Dusseldorf, the largest European steel and heavy industrial combine, set up a new record in the past year, during which its profits rose from 222,000,000 rm. to 260,000,000 rm.

The Krupps armament factories also show an increase in profits from 395,000,000 to 421,000,000 rm. This increase was obtained despite the fact that during the last quarter the factories did not operate to full capacity owing to shortage of labor and raw materials, and to the difficulty in making repairs.

OPACS Considering Revisions In Order Freezing Steel Prices

Washington

• • • **The Office of** Price Administration and Civilian Supply is working on some revisions of the steel price order which, though issued on April 17, froze steel prices as of March 31.

There have been conferences between representatives of the steel industry and Leon Henderson's office regarding various phases of this order.

One request that the steel companies are reported to have made is that prices be frozen as of the date of the order and not March 31. This would permit the charging of higher prices on galvanized pipe and galvanized nails, changes on which went into effect subsequent to March 31, but before April 17.

Steel companies have objected to the interpretation of the order by which they must equalize freight rates with distant basing points when shipping outside their own producing district. This has been particularly onerous in the case of steel shipped to the Pacific Coast by all-rail at a high freight rate when shipments taking the Pacific Coast base prices have ordinarily been shipped by rail and water at lower rates. Diversion of intercoastal ships for other shipping requirements made it necessary for the mills to ship all-rail.

The question of the prices to be charged on export sales is also before the OPACS for decision. This question is: Shall the Steel Export Association prices that were in effect March 31 be considered the ceiling prices for export trade or the domestic prices as of that date. Export prices were generally higher than domestic prices.

Percentage Rating Plan For Scarce Materials

Washington

• • • **A new percentage** priority plan designed to give specified manufacturers of "off-the-shelf" supplies preference rating of A-10 on all scarce materials entering into defense contracts, was released this week by OPM priorities division.

The plan will be tried experimentally on 500 producers of industrial motors, cutting tools, portable tools, hack and band saws, lathe tools, files, socket screws, roller and silent chains, and scientific instruments. Letters of instructions were sent to these manufacturers, together with forms to be filed by companies desirous of qualifying under the plan.

Identified as the Defense Supplies Rating Plan, the new priorities machinery will be administered by Joseph L. Overlock, of the OPM priorities division. It is designed to supplement other forms of priority aid, including the individual preference ratings which will continue to be used, and is optional with a manufacturer.

Under this plan, applicable only to production which can be identified with defense, so-called scarce materials are given an A-10 rating, effect of which is to place such orders ahead of non-defense contracts or orders carrying lower ratings.

The prescribed formula, by which a manufacturer determines the proportion of his total production going into identifiable defense channels, works out this way:

1. The manufacturer determines from his sales records for the preceding quarter the percentage of defense sales to total sales.

2. From his production schedules for the current quarter, he ascertains the total quantity of scarce materials necessary to complete his total production schedule.

3. He then determines the quantities of scarce materials required for his defense production by applying the percentage developed in the sales analysis to the total quantities of scarce materials necessary to complete his total production schedule.

April Machine Tool Shipments $60,300,000

Cleveland

• • • Machine tool shipments in April totaled $60,300,000, according to the latest report of the National Machine Tool Builders Association here. This represented a substantial rise over the $57,400,000 March shipments and the $54,000,000 total of February. For the year 1941 to May 1 shipments exceeded $220,000,000, well over double the volume in the same four months of last year.

Roosevelt Gets Letters on West Coast Steel Plant

Washington

• • • **President Roosevelt** has received four or five letters on the proposal to build additional steel facilities on the West Coast, but has passed them on to various government agencies for further study.

This was the reply given by Mr. Roosevelt at his press conference on Tuesday when asked if he had received an OPM communication on the feasibility of West Coast steel expansion. The Chief Executive did not identify the agencies to which he referred the letters, and indicated that no conclusions had been reached as a result of the studies.

At the same time, the OPM refused to comment on the report that it had denied the application of Henry J. Kaiser for a certificate of necessity to build steel facilities on the Pacific Coast.

Steel Skeleton Buildings Called Safest in Raids

• • • **All commercial buildings** and all residential buildings more than three stories in height should be of a skeleton construction of steel frame or reinforced concrete to withstand aerial bombardment, declared Dr. Harold E. Wessman, chairman of the Department of Civil Engineering of New York University, and Professor William A. Rose, at the close last week of a government-subsidized course in bombardment protection. It was pointed out to the fifty construction engineers and government and utilities experts who attended the course that in London bombs hitting buildings with floor-bearing walls had in most instances caused complete collapse of the structures.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **C. R. Cox** has been elected vice-president, National Tube Co., Pittsburgh, succeeding **B. C. Moise** who has retired after more than 50 years' continuous service. **E. N. Sanders,** formerly assistant vice-president, operations, has been elected vice president in charge of operations, succeeding Mr. Cox. Mr. Moise entered the service of Riverside Iron Works (later National Tube Co.) in 1890 and served consecutively to 1901 in various clerical positions. In 1901 he was made cashier of National Tube and from 1901 to 1905 served as assistant treasurer and assistant secretary. From 1905 to 1912 he was auditor, assistant treasurer and assistant secretary, from 1912 to 1927 auditor and secretary, from 1927 to 1935 vice-president, secretary and auditor and from 1936 to his retirement, vice-president. Mr. Cox started his career in 1914 with Marwick, Mitchell-Peet & Co. He later was affiliated with the U. S. Shipping Board Emergency Fleet Corp., Crucible Steel Co. of America, Babcock & Wilcox Tube Co. and from 1934 to 1936 was general superintendent, Ellwood works, National Tube. From 1936 to his recent promotion he was vice-president in charge of operations, National Tube. Mr. Sanders began his career in 1919 as a chemist with King Chemical Co. He later was with the National India Rubber Co., Jones & Laughlin Steel Corp. and in 1935 became assistant general superintendent, Ellwood works, National Tube. From 1936 to 1940 he was general superintendent and in 1940 was made assistant vice-president, operations.

• **W. R. Swoish** has been appointed vice-president in charge of sales of the Roller-Smith Co., Bethlehem, Pa. Graduating from Ohio State University in 1921, he joined the Westinghouse Electric & Mfg. Co., where he served in various capacities. He joined the Roller-Smith company in 1939 as sales manager. **James E. Bevan** has been named vice-president in charge of manufacturing operations of Roller-Smith. A graduate of Lehigh University in 1925, Mr. Bevan went to Roller-Smith in 1928, having been previously connected with the Bethlehem Steel Co. and the Philadelphia Electric Co.

• **R. W. Mick,** general manager of the Harter Corp., Sturgis, Mich., has been placed in charge of the operation of the factory and the entire Harter organization. The company policies laid down by Evan C. Harter will be maintained by Mr. Mick.

• **Ralph Damon,** operating vice-president of American Airlines, has been elected president of the Republic Aviation Corp., Farmingdale, N. Y., succeeding **W. Wallace Kellett,** who has been named chairman of the board. **Frederick G. Coburn, Jr.,** of New York; **Lester Watson,** of Boston, and Mr. Damon were elected to the board of directors.

• **J. B. Chinn,** formerly of New Orleans, has been appointed Birmingham representative of Hickman Williams & Co., Cincinnati. Mr. Chinn succeeds **John K. Travis,** who was appointed Birmingham representative of the Philip W. Frieder Co., Cleveland.

C. R. COX, executive vice-president, National Tube Co., Pittsburgh.

B. C. MOISE, who has retired as executive vice-president of the National Tube Co.

E. N. SANDERS, vice-president in charge of operations, National Tube Co.

• **Dexter A. Tutein,** who for many years has been engaged in the selling of steel, pig iron, coke, ores, etc., in New York and Philadelphia, has joined the Office of Price Administration and Civilian Supply in Washington.

• **George H. Dowding** has been appointed superintendent and **Elmer A. Johnson** assistant superintendent of industrial relations of South Works of Carnegie-Illinois Steel Corp. Mr. Dowding succeeds A. L. Armantrout, who last week was named superintendent of industrial relations of the corporation's Lorain division at Johnstown, Pa. He has been at South Works since 1922, starting in the yard department. Previously he had gained experience in the corporation's Gary sheet and tin mills as well as in the Chicago office. Mr. Johnson has for the last three years served as assistant to division superintendent of rolling, in charge of personnel matters. He is a native of Joliet, Ill., and has been connected with the United States Steel subsidiary since 1909.

• **R. B. Nichols,** former secretary, Bantam Bearings Corp., South Bend, Ind., has been named vice-president and general manager and **J. Frank Oehlhoffen,** who has been serving in the capacity of assistant sales manager, has been made Bantam's sales manager.

JOHN H. FLAGG, general manager of the Watson-Flagg Machine Co., Inc., Paterson, N. J., who was elected vice-president of the American Gear Manufacturers Association at the 25th annual meeting, held at Hot Springs, Va., May 5-7.

• **A. E. Bottenfield,** formerly with the stoker division of the Whiting Corp., has reorganized the Whiting Stoker Co., Chicago, with **George W. Graham,** who had operated this plant previously. Mr. Graham is president of the new company and Mr. Bottenfield, vice-president and general manager.

• **Forrest G. Sharpe,** formerly assistant to the sales manager of the Pangborn Corp., Hagerstown, Md., has been appointed Philadelphia sales manager, replacing the late William T. Randall.

• **Glen T. Lampton** has been named assistant engineer in charge of experimental engineering and revision of the engineering department organization of the Hamilton Standard Propellers division of United Aircraft Corp., East Hartford. Until recently, Mr. Lampton was engineering manager of the Lycoming division of the Aviation Mfg. Corp.

• **Frank J. Zink,** formerly associate professor of agricultural engineering at the Kansas State College, and more recently connected with farm equipment companies in research and sales capacities, has joined the Farm Equipment Institute's headquarters' staff.

• **John D. Porter** has been named works manager of Federal Motor Truck Co., Detroit. He will have direct charge of production, planning and material control.

• **R. J. Lindquist,** for years chief auditor of the RFC, Washington, has been elected vice-president and a director of the Reynolds Metals Co., Richmond, Va. After becoming a certified public ac-

R. B. NICHOLS, vice-president and general manager, Bantam Bearings Corp., South Bend, Ind.

J. FRANK OEHLHOFFEN, sales manager, Bantam Bearings Corp.

R. J. LINDQUIST, vice-president, Reynolds Metals Co., Richmond.

countant in 1924, he worked for Gray, Hunter & Co., Quincy, Ill., and Arthur Anderson & Co., Chicago. He was general auditor of the Chicago Joint Stock Land Bank, Chicago, before being called to Washington.

• **G. Hobart Stebbins,** president of the Boston Dry Dock Co., Chelsea, Mass., for many years before it was absorbed by other interests, and subsequently connected with the Bethlehem Steel Co.'s East Boston ship repair plant, has joined the Associated Shipbuilders, Seattle.

• **Dr. T. Swinden,** of the central research department of the United Steel Companies, Sheffield, England, has been awarded the Bessemer Gold Medal for 1941 by the council of the British Iron and Steel Institute in recognition of the value of his original investigations on the metallurgy of steel and of the services he had rendered in the organization and direction of research in the steel industry.

• **Arno L. Billeter** has been appointed assistant to general superintendent in charge of manufacturing practice, Carnegie - Illinois Steel Corp., Pittsburgh. **Thomas W. Hunter** has been made superintendent of the flat products finishing division at the company's Irvin works. Mr. Billeter has been employed by subsidiaries of U. S. Steel Corp. since 1919. He worked at the Gary sheet and tin mills until 1937 when he went to the new Irvin works as superintendent of cold reduction. He has been superintendent of flat products finishing since October, 1938. Mr. Hunter joined Carnegie-Illinois as assistant tin house superintendent at Shenango works, New Castle, Pa., in 1936. He went to Irvin works as assistant to the superintendent of tin finishing in 1937 and later became general foreman of cold reduction. He has been assistant division superintendent of flat products finishing since April, 1940.

• **George Eglinton,** who for a number of years has been vice-president and general manager of the Lincoln Park Tool & Gage Co., Lincoln Park, Mich., has resigned to become vice-president and director of sales of Charlesworth, Inc., Cleveland.

Obituary

THE LATE George R. Munschauer, president, Niagara Machine & Tool Works, and treasurer, Heinz & Munschauer, Buffalo.

• **George R. Munschauer,** for 23 years president of the Niagara Machine & Tool Works, Buffalo, died April 24, at the age of 61 years. Mr. Munschauer had been associated with the company for 44 years. He was also treasurer of Heinz & Munschauer, Buffalo.

• **Allen V. Potter,** Detroit sales representative, for the Speer Carbon Co., Saint Marys, Pa., died April 25, aged 36 years.

• **Oscar Caperton Huffman,** a director and a former president of Continental Can Co., Inc., died May 5 in New York. He was 64 years old. In 1903 Mr. Huffman organized the Virginia Can Co. remaining as its president until 1916. In 1908 he moved to Cincinnati, where he established the United States Can Co., which he also headed as president.

In 1928, when the United States Can Co. was merged with the Continental Can Co., Inc., Mr. Huffman was appointed vice-president. In 1930 he was made president of Continental, resigning Feb. 1, 1940. At the time of his death he was a director of the company.

• **John C. Glass,** for 18 years Cleveland sales representative for the Midvale Co., and since 1937 in charge of the company's Chicago district sales office, died May 8 in Cleveland, aged 51 years.

• **Evan C. Harter,** founder and president of the Harter Corp., Sturgis, Mich., died in Sturgis on May 2. He was 53 years old. Mr. Harter's first position was with the Kawneer Co. of Niles. He later joined the Metal Forming Co., Elkhart, Ind., and in 1926 organized his own company and became associated with Harry E. Montague in founding the Kant Kut Tube Co.

• **William Johnson,** North Adams, Mass., foundryman, died at his home in that city on May 7, aged 70 years. Mr. Johnson, who was born in Copake, N. Y., went more than 50 years ago to North Adams, where he first worked in Hunter's Foundry. After several years he and the late William H. Corkum purchased the Brooklyn Street foundry which subsequently was renamed Johnson's Foundry.

• **Sydney Jawitz,** who for nine years was associated with his father, Meyer Jawitz, in the Electric Hoist & Motor Co., Brooklyn, was killed accidentally on April 14. He was 28 years old, a graduate of New York University school of engineering.

• **George J. Seiss,** aged 64 years, president and founder of the Seiss Mfg. Co., Toledo, died May 4, after a long illness. He founded the company in 1903.

• **Francis J. Yawman,** for 40 years with Yawman & Erbe Mfg. Co., Rochester, N. Y., died May 2, aged 65 years. Since 1932 Mr. Yawman had been president of the firm which his father founded.

• **Arthur Castle,** vice president of the Wilmot Castle Co., Rochester, N. Y., died May 2. He was 77 years old.

• **John C. Glass,** Chicago district sales manager of the Midvale Co., died on May 8.

• **Louis T. Lott,** for 15 years a member of the sales department of the Weirton Steel Co., died May 11 in New York. At the time of his death he was district manager of sales in the Pittsburgh office.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	May 20, 1941	May 13, 1941	Apr. 22, 1941	May 21, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvan. sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	May 20, 1941	May 13, 1941	Apr. 22, 1941	May 21, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.24
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	31.34	31.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melting steel, P'gh.	$20.00	$20.00	$20.00	$18.75
Heavy melt'g steel, Phila.	18.75	18.75	18.75	17.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	17.25
Carwheels, Chicago	.....	.....	.....	18.75
Carwheels, Philadelphia	.....	.....	.....	20.75
No. 1, cast, Pittsburgh	22.00	22.00	23.25	19.25
No. 1, cast, Philadelphia	24.00	24.00	24.00	20.25
No. 1, cast, Ch'go*	*21.00	*21.00	*22.60	16.75

*Changed to gross ton basis.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$5.625	$4.00
Foundry coke, prompt	6.875	6.875	6.25	5.25
Non-Ferrous Metals:				
(Per Gross Ton)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.50
Copper, Lake, New York	12.00	12.00	12.00	11.50
Tin (Straits), New York	52.25	52.25	52.50	54.00
Zinc, East St. Louis	7.25	7.25	7.25	5.75
Lead, St. Louis	5.70	5.70	5.70	4.85
Antimony (Asiatic), N.Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 131-140 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
May 20, 1941	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26c. a Lb.	$22.61 a Gross Ton	$17.92 a Gross Ton

	High	Low
1941		
1940	2.261c., Jan. 2	2.211c., Apr. 16
1939	2.286c., Jan. 3	2.236c., May 16
1938	2.512c., May 17	2.211c., Oct. 18
1937	2.512c., Mar. 9	2.249c., Jan. 4
1936	2.249c., Dec. 28	2.016c., Mar. 10
1935	2.062c., Oct. 1	2.056c., Jan. 8
1934	2.118c., Apr. 24	1.945c., Jan. 2
1933	1.953c., Oct. 3	1.792c., May 2
1932	1.915c., Sept. 6	1.870c., Mar. 15
1931	1.981c., Jan. 13	1.883c., Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

	High	Low
1941	$23.61, Mar. 20	$23.45, Jan. 2
1940	23.45, Dec. 23	22.61, Jan. 2
1939	22.61, Sept. 19	20.61, Sept. 12
1938	23.25, June 21	19.61, July 6
1937	23.25, Mar. 9	20.25, Feb. 16
1936	19.74, Nov. 24	18.73, Aug. 11
1935	18.84, Nov. 5	17.83, May 14
1934	17.90, May 1	16.90, Jan. 27
1933	16.90, Dec. 5	13.56, Jan. 3
1932	14.81, Jan. 5	13.56, Dec. 6
1931	15.90, Jan. 6	14.79, Dec. 15
1930	18.21, Jan. 7	15.90, Dec. 16
1929	18.71, May 14	18.21, Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

	High	Low
1941	$22.00, Jan. 7	$19.17, Apr. 10
1940	21.83, Dec. 30	16.04, Apr. 9
1939	22.50, Oct. 3	14.08, May 16
1938	15.00, Nov. 22	11.00, June 7
1937	21.92, Mar. 30	12.92, Nov. 10
1936	17.75, Dec. 21	12.67, June 9
1935	13.42, Dec. 10	10.33, Apr. 29
1934	13.00, Mar. 13	9.50, Sept. 25
1933	12.25, Aug. 8	6.75, Jan. 3
1932	8.50, Jan. 12	6.43, July 5
1931	11.33, Jan. 6	8.50, Dec. 29
1930	15.00, Feb. 18	11.25, Dec. 9
1929	17.58, Jan. 29	14.08, Dec. 3

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Mandatory priorities for plates and shapes probably next in line as larger ship and railroad requirements appear . . . 156,000 tons of pipe allocated for two petroleum lines . . . Shell steel orders to come in larger volume . . . Flow of scrap retarded under new price.

MANDATORY priorities for plates and shapes probably will be next in line in the tightening control over steel supplies by Government agencies. Many of the steel companies are no longer opposed to such action, since it is seen as the only way in which deliveries can be speeded up to take care of vital defense projects.

An already tight situation in plates will be further complicated by the allocation this week of 400,000 tons for ships, which will be distributed to all producers on the basis of mill capacity. On top of this there will probably come soon an allocation of at least 500,000 tons for railroad equipment, a situation that is now being closely studied in Washington. Pressure for ship steel has been intensified. Steel for cars may also be given urgent preference ratings.

THE whole transportation problem has now become definitely an important part of the defense program owing to war developments that have diverted ships from their normal routes. The virtual commandeering of ship tankers has created a sudden need for pipe lines to carry petroleum products to seaboard. About 156,000 tons of pipe has been allocated for two lines, one to be built from Baton Rouge, La., to Greensboro, N. C., and Atlanta, Ga., and the other from Portland, Me., to Montreal, Que. The line from Louisiana will be built by Standard Oil of New Jersey and Shell Oil Co. and will carry a variety of products, including crude oil, fuel oil, gasoline, etc., the first general products line to be built in this country. Another line of 1500 miles, projected to run from Texas to the Atlantic Coast, is in the tentative stage, but if it materializes will take fully 400,000 tons of pipe.

These new projects are being superimposed on commitments which had already usurped practically all of the steel that the mills can produce this year and beyond. In this situation the steel companies have come to the realization that the decision as to what is essential and what is non-essential must be made at Washington and not by the individual producers.

FOR two months the mills have rolled no carbon steels for Great Britain. Now, under the provisions of the Lease-Lend Act the Secretary of the Treasury is taking bids on 1,000,000 tons, about three-quarters semi-finished, to be rolled for Britain over a period of four months. This tonnage is in addition to 300,000 to 400,000 tons of tin plate required by the British over a year and about 250,000 tons of pig iron.

Shell steel orders will now begin to flow more freely. It is reported from Chicago that 600,000 tons of shell rounds will be awarded in that district alone for just one size shell.

Much of the new business that is now being placed with the mills is for defense requirements. With their regular customers the mills some time ago established monthly quota arrangements, but these are being greatly disturbed by the necessity of working defense orders into current rollings. It seems to be obvious that consumers who do not have preference ratings will be subject to longer delays on shipments and possible curtailment of their quotas.

While new steel orders in the aggregate have been declining, they are still greater in volume than shipments. Except for defense work, mills are placing restrictions on orders and are turning down a great many.

TWO important priority actions have been taken by the Office of Production Management. Supplies of nickel have been placed under strict allocation, this procedure supplanting the former control under mandatory priorities. It was announced that supplies of nickel flowing into civilian channels would be drastically curtailed. The other order established a percentage priority plan for "off the shelf" products that are essential to national defense. The plan will be tried experimentally on a group of about 500 producers of industrial motors, cutting tools, portable tools, hack and band saws, lathe tools, files, socket screws, roller and silent chains and scientific instruments. These manufacturers will receive an A-10 rating, placing their requirements for defense purposes ahead of non-defense orders.

THE revised government price schedule for iron and steel scrap has been in effect only two weeks, yet it is apparent that one result has been to retard the flow of scrap. This seems to be partly due to confusion in the trade as to the exact meaning of some regulations, which may be further clarified.

Recovering the ground lost in the April coal strike, the steel industry is now back to the 100 per cent rate of late March, but another shutdown of southern coal mines would produce a setback of more serious consequences, as coal, coke, scrap and raw steel reserves have been depleted.

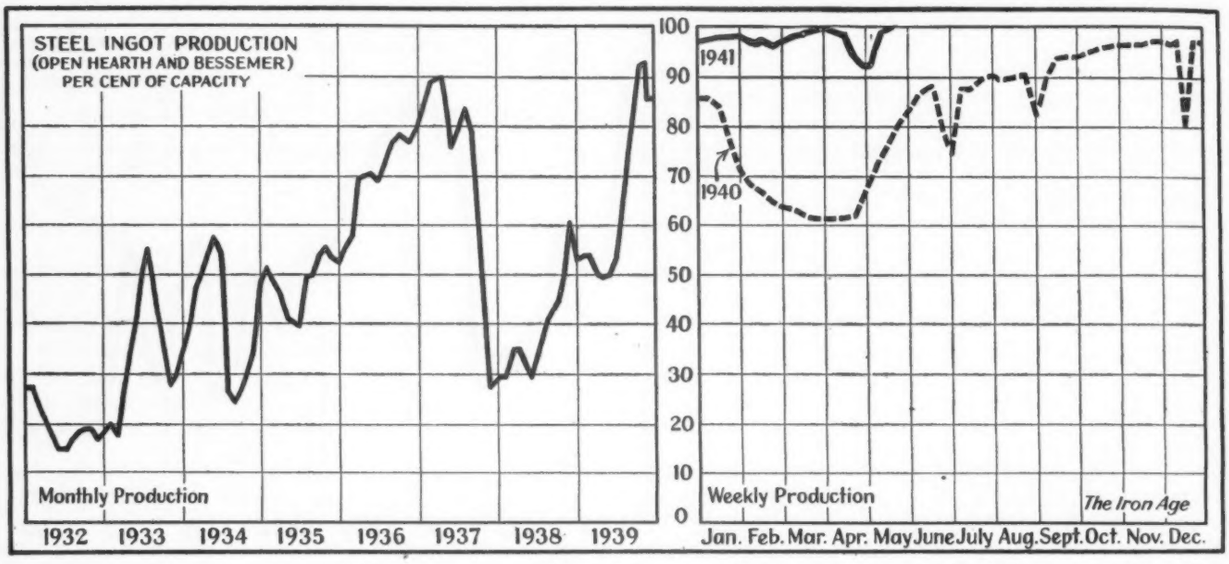
The Industrial Pace . . .

Industry continues its efforts to recover ground lost during the April coal strike. Reflecting this effort, THE IRON AGE index of capital goods activity rose 2.4 points in the past week to 111.8 per cent of the base years, but was still far short of the pre-strike level of 119.

Seasonal adjustments caused slight losses in construction and carloadings factors of index in the past week. Automobile output also showed a slight easing from previous week's peak. These losses, however, were more than counteracted by sharp gains in the steel and Pittsburgh series.

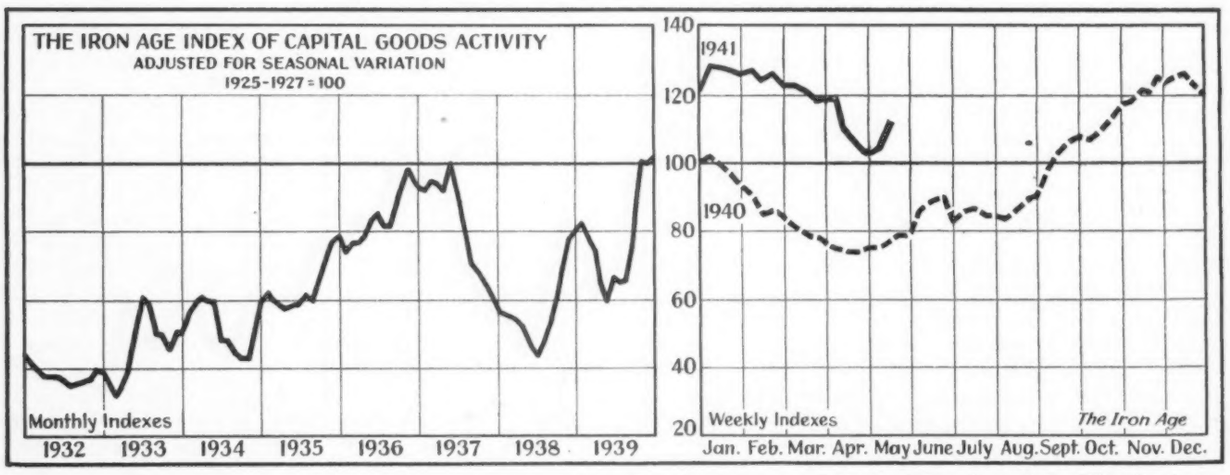
Changing nature of aid to Britain is reflected in the continued downward trend of iron and steel exports (see accompanying graph). War aid now is chiefly in the form of finished goods as tanks, guns, ammunition, etc., which are not reported as iron and steel exports. Electric energy production continues to hold at about 16 per cent over pace of a year ago, but is below the 1940 peak of December. This peak, however, was affected by the usual seasonal movement demand at that time and fall and winter use of electric energy this year will probably continue to hold above the 1940 level.

Ingot Production Again Reaches 100%



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week ..	101.0	102.5	99.0	96.0	96.0	106.0	85.0	87.0	99.0	104.0	102.5	111.0	101.5	**100.0**
	Previous Week..	100.0	102.0	97.0	96.0	97.0	104.5	85.0	104.0	99.0	101.5	102.5	111.0	101.5	**99.5**

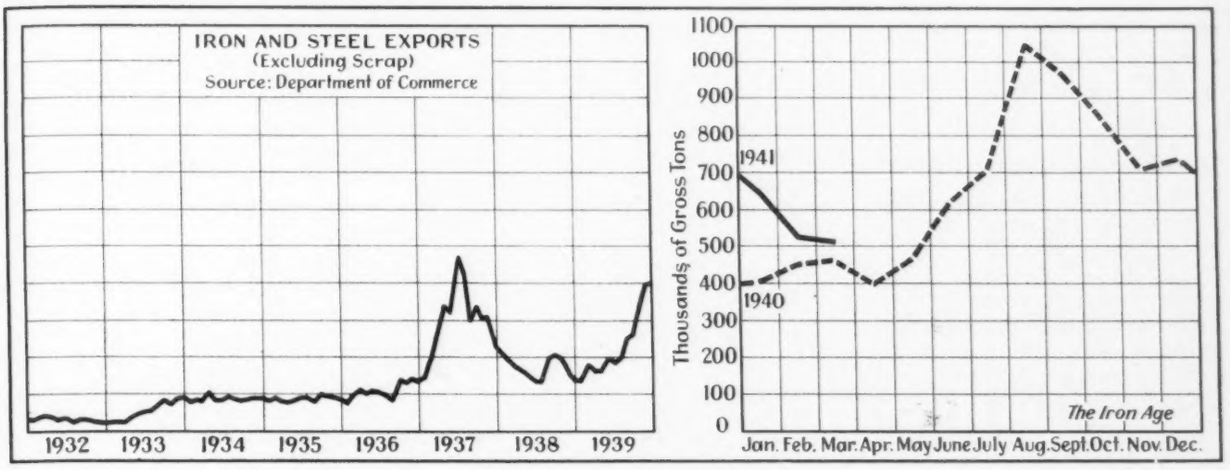
Capital Goods Index Gains 2.4 Points



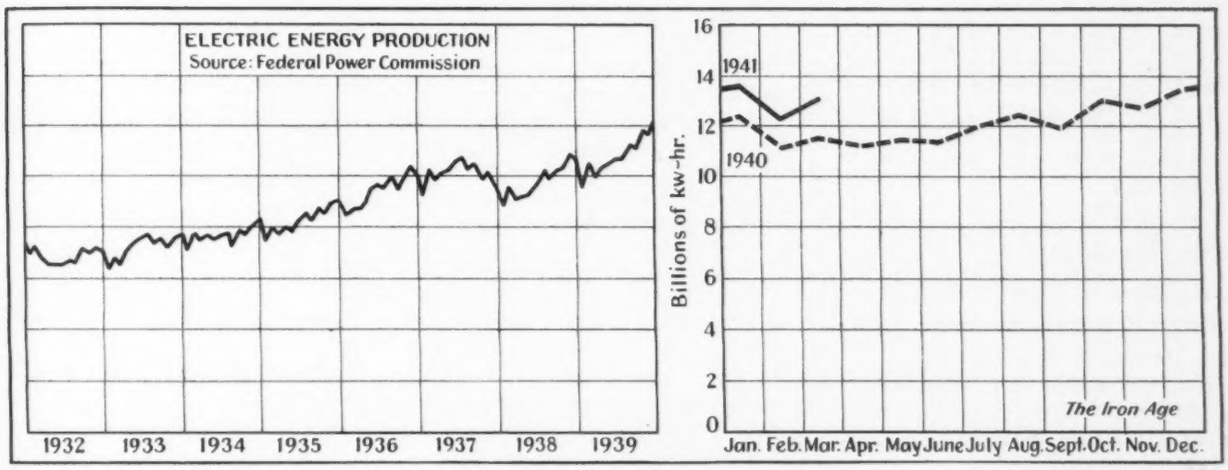
▼ Component Week Ended ➤	May 17	May 10	Apr. 19	May 18 1940	May 18 1929
Steel ingot production[1]	134.0	130.7	130.8	90.8	129.0
Automobile production[2]	107.7	110.7	81.0	83.7	128.9
Construction contracts[3]	120.8	121.2	141.2	62.8	126.1
Forest products carloadings[4]	71.6	75.3	69.9	58.9	122.8
Pittsburgh output and shipments[5]	124.8	109.1	95.7	87.4	124.7
COMBINED INDEX	111.8	109.4	103.7	76.7	126.3

Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended April 26. Other indexes cover week of May 3.

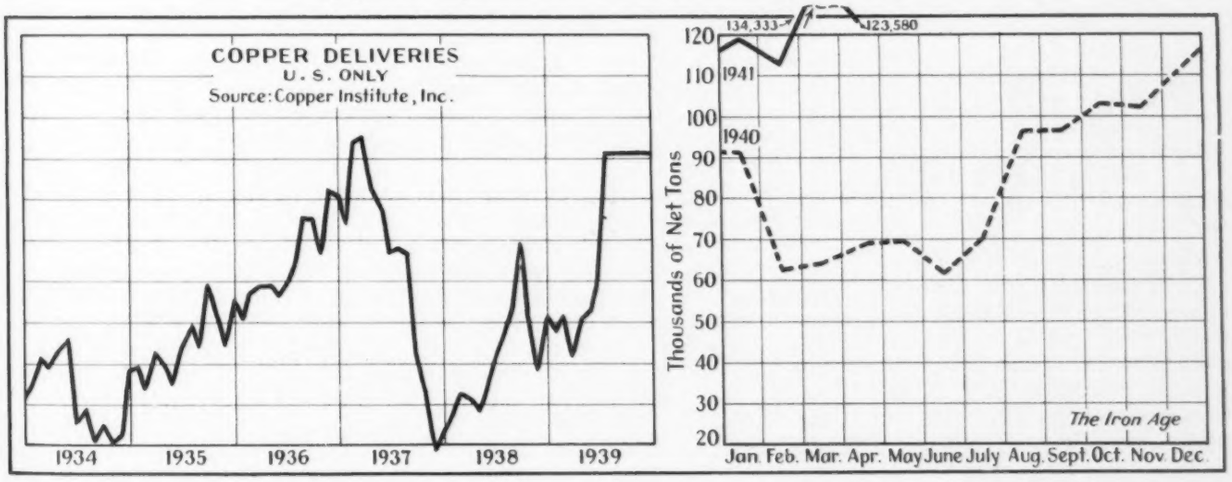
Steel Exports Decline Again in March



Electric Energy Output 16% Over Year Ago



Copper Shipments Off From March Peak



Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

Steel Operations

. . . Industry rate advances to 100 per cent, recovering lost ground

Recovering the ground lost during the April coal strike, the steel industry has regained the 100 per cent operation of late March. There has been a sharp drop at DETROIT. But elsewhere there have been gains which more than offset this. PITTSBURGH is up a point to 101 per cent, CHICAGO has gained a half point to 102.5 per cent, and the YOUNGSTOWN area is up two points to 99 per cent, BUFFALO is one and a half points higher and SOUTHERN OHIO is up two and a half points.

Two open hearth furnaces of the American Steel & Wire Co., which have not been in operation for several years, are being rebuilt at Duluth, Minn. These two furnaces, when placed in operation will increase the annual ingot capacity of the company to the extent of 174,000 tons.

New Business

. . . Heavy allocations for defense pending . . . other orders slow up

The decline in new bookings in the past two weeks at PITTSBURGH still leaves an order volume in excess of shipments, hence backlogs are being increased further.

Defense requirements, both direct and indirect, are rapidly reaching a point where they comprise 35 to 50 per cent of total specifications. The physical impossibility of even partially satisfying commercial steel requirements and at the same time expediting national defense work is giving the steel industry the toughest problems in its history and is causing a definite drift in opinion toward mandatory priority control.

The probable allocation this week of 400,000 tons of plates for shipbuilding and possibly 500,000 tons of steel, mostly plates, for a railroad equipment program will greatly increase the difficulties of the mills in filling orders which are not primarily for defense work.

For large pipe lines, 156,000 tons of pipe has been tentatively allocated. (See Tubular Products.)

Principal interest in the steel market at CLEVELAND this week centers in the inquiry for 1,000,000 tons of steel for the British, which comes on top of record domestic demand that has fiilled order books for months ahead and created an unprecedented clamor for semi-finished material among mills' own finishing departments. Early deliveries are required and will be followed by British inquiry for large tonnages of pig iron, in addition to tin plate.

This development and recent indications of expanded requirements for the defense program all point to continued high ingot output, barring such unforeseen and involuntary factors as mechanical wear and tear, labor trouble or raw material shortages. Operating executives at CLEVELAND believe they can continue to maintain a satisfactory pace.

A sharply pronounced drop in new orders and in pressure for deliveries has come to CHICAGO producers like a relief wave. Some mills report more than 50 per cent decrease in new orders. Still, incoming business is equal to shipments in all cases. Producers there look for automotive business to fall abruptly within a very short time, matched in decline with specifications from household appliance builders. Defense business has given structural fabricators full shops for three to four months ahead. Badly shocked plate and structural shape books are getting pushed around even more with new demands coming from Gulf and Pacific Coast shipyards. Piling and concrete bar business is strong, almost entirely for defense needs.

A combination of the approaching inventory control and more stringent restrictions on the part of the mills has acted to slow up the volume of new orders being booked by PHILADELPHIA sellers. Despite this easing, the past week's bookings were still in excess of shipments. The rising volume of defense work is cutting more deeply into civilian work, particularly in sheets, plates, bars and pig iron. The problem of allocating supplies in some lines is becoming so complicated that many mills expect early action from Washington setting up formal preference ratings for such products as shapes and plates, and possibly bars and pig iron.

Sheet producers in SOUTHERN OHIO report a slowing up in the number of orders now being received. In addition, they indicate that virtually all business now sought is for defense purposes only, since other consumers were covered earlier in the quarter.

Bookings at BIRMINGHAM approximate volume for the corresponding period in April. Heavy railroad car orders since the first of April have increased backlogs that already were of record size.

Iron Ore

. . . May movement on lakes may total 10,000,000 tons

Nearly 6,000,000 tons of Lake Superior iron ore had been brought down the Great Lakes during the month of May up to the beginning of this week, indicating that the movement for the full month would be well over 10,000 gross tons.

American Great Lakes ore fleet of 292 vessels was operating at 100 per cent of capacity May 15.

Lake Superior iron ore consumption during April was 5,802,088 gross tons, a decline of 609,443 tons from the March level of 6,411,531 tons. This slump, of course, was caused mostly by the coal strike which necessitated the blowing out or banking of a number of stacks.

Exploration of the possibility of moving some 30,000 to 40,000 tons of iron ore from Spain to this country is under way. This material is above ground and is convenient for ship loading. The Spanish mining companies are reported as having ships available and are trying to arrange safe conduct for the Atlantic crossing. The plan being studied calls for bringing ore to this country and on the return trip carrying grains and other foodstuffs needed in Spain. If this ore can be shipped, it would probably be used by Eastern seaboard furnaces.

Pig Iron

. . . Carnegie-Illinois put on three blast furnaces

Carnegie-Illinois Steel Corp. is this week blowing in a blast furnace at its Carrie works, Rankin, Pa., and another furnace at its Ohio works, Youngstown, which means that all six furnaces at Carrie and all six at the Ohio works will be in blast. In the combined Pittsburgh-Youngstown area, Carnegie-Illinois will have 32 out of 36 blast furnaces in production.

In the Chicago district Carnegie-Illinois reached an all-time high late last week when the 12th blast furnace at Gary works was put in blast. With this addition, 22 out of 23 furnaces are in operation and it is not unlikely that the 23rd will be blown in shortly. The company now has 1200 coke ovens in operation in that district with a capacity of 17,500 tons daily.

CLEVELAND reports a definite ceiling is being placed on expansion of foundry output through difficulty in obtaining skilled men and materials. In the latter classification coke and scrap for higher operations are particularly difficult to find. At the same time many foundries are getting inquiries from diversified plants which desire to substitute castings for vital parts in various consumer goods. CLEVELAND sellers assert that regular customers are being served promptly and fairly on the basis of their requirements.

The pig iron situation in Philadelphia is growing progressively more difficult with no prospects of relief in sight. While no foundries in Eastern Pennsylvania have yet been forced to suspend operations, consumers' stocks are slowly being depleted and any interruption to blast furnace operations, such as another coal strike, would have serious repercussions in the merchant trade. New pig iron orders are being taken very cautiously and most merchant furnace sellers are not inclined to book tonnage beyond June, although a small amount of contract business has been taken for late 1941 shipment at prices then in effect.

No decision has yet been reached over the possibility of relighting the Chester, Pa., furnace, but the possibility that a large district steel producer may shortly undertake to operate the unit is described as very likely.

While shipments of pig iron into the SOUTHERN OHIO district are now apparently adequate for the current melt, they are not sufficient to permit consumers to build up reasonable backlogs against possible curtailments later.

At Buffalo shipments are now going out at an accelerated rate and the trade is reported to be "more orderly minded.' Consumers apparently are resigned by now to the fact that they simply have to take the chance of obtaining supplies as they need them. Producers have exhausted their soft coal and coke reserves and a second mine tieup would have immediate repercussions in this district.

Shipments of pig iron to melters in the St. Louis area continue at a peak rate, but buying consists only of a carload here and there to fill for the remainder of the second quarter.

Sheets and Strip

. . . High speed mills to make more ship plates

Production of ship plates on high speed mills continues to push sheet deliveries behind. Some PITTSBURGH makers are quoting early 1942 as the best they can do on hot and cold rolled material. Deliveries to automobile concerns continue at record levels. Special "expediters" from large consuming interests who have been coming to PITTSBURGH to lodge complaints about deferred deliveries, are finally realizing the extent to which the national defense program has entered into all phases of steel making.

Pressure from automotive purchasers is lessening in CHICAGO. This comes at a time when talk is heard of strip mill capacity being converted to plate production wherever possible, though no definite action has been taken by any mill there. Orders for the fourth quarter of 1942 are reported in all sizes by one mill.

The galvanized sheet situation is acute. Great difficulty was experienced at St. Louis in placing an order for 500 tons, required for a small arms ammunition plant under construction there.

Structural Steel

. . . 22,200 tons awarded, new projects only 10,200 tons.

Fabricated structural steel awards of 22,200 tons are slightly lower than a week ago. The outstanding lettings are 4000 to 5000 tons for navy aviation facilities at Sitka and Kodiak Island, Alaska; 1900 tons for a state highway bridge in Allegheny County, Pa.; 1526 tons for public school No. 120 in New York; 1500 tons for two government warehouses at Jeffersonville, Ind.; and 1100 tons for transmission towers at Strawberry Plains, Tenn., for TVA.

New structural steel projects dropped to 10,200 tons from 33,600 tons last week. The only new job of size reported is 2200 tons for a gun directer plant at Pittsfield, Mass., for the General Electric Co.

Bolts, Nuts and Rivets

Buffalo makers of bolts advances prices . . . Cap screws also up

Advancing costs forced upward price adjustments of 7 to 10 per cent by a bolt maker at Buffalo last week. A leading CLEVELAND cap screw manufacturer, also forced to act by heavy overtime and other cost factors, raised cap and set screw prices approximately 12½ per cent.

Wire Products

. . . Defense requirements leave less for commercial users

Direct and indirect defense requirements are increasing rapidly and in some cases constitute 40 to 50 per cent of material being shipped. PITTSBURGH wire makers, although serving only regular customers, find total business volume more than current shipments.

The proportion of rod and wire output entering the defense program is growing at CLEVELAND, leaving less for ordinary commercial users. Drawing blocks are heavily occupied but occasionally are slowed by insufficient rod supplies, a situation which reflects the jam on raw steel. Nail stocks in some of the retail and jobber outlets at CLEVELAND continue unbalanced.

Plates

. . . Shipbuilding and car material to add to problems

With ship plates getting the right of way over all other plate orders and with the definite possibility that freight car material will be put on the "must" list soon, commercial plate users without defense contracts will find it increasingly difficult to obtain supplies anywhere near the time required. It is understood 400,000 tons of plates for the Maritime Commission is to be allocated soon to various mills on the basis of their plate capacity.

Ponderous plate backlogs—all earmarked for defense—have CHICAGO producers' backs against the wall. Question of which preference rating comes first is major problem. Practically all producers are thinking of converting strip mill capacity to plate production wherever possible.

It is estimated at CLEVELAND that approximately 60 to 70 per cent of current plate production represents direct defense business.

An Eastern non-integrated mill is still out of the market pending a decision from Washington on its request for relief from the price ceiling set by OPACS.

Export Trade

. . . Bids being taken on 1,000,000 tons of steel for British

Operating under the Lend-Lease Act, the Procurement Division, Treasury Department, will open bids on Saturday of the present week for 1,000,000 tons of steel for Great Britain, a considerable portion of the tonnage having been previously suspended or cancelled. The transaction under the new purchase plan means a transfer of British financial accounts from private producers to the Federal Treasury.

Ingots constitute the largest item, amounting to 266,000 gross tons, followed in order by 230,000 tons of billets and 100,000 tons each of slabs and sheet bars, and 70,000 tons of shell steel. Other items in tons are: structural sections, 50,000; bars, 41,000; tube materials, 40,000; wire rods, 30,000; rails, 20,000; forging quality ingots and semi-finished steel, 20,000; shipbuilding material, 15,000; wire and wire products, 10,000; tubes, 5000; bolts and nuts, 3000.

Some of the breakdowns of the foregoing classifications and tonnages follow:

Billets: up to and including 2½ in., 120,000; 2½ to 4 in., 40,000; 4 in. and upward, 30,000; special, 40,000.

Structural sections: plates and sheets, 25,000; angles, tees and channels, 10,000; beams, 5000; all round bars, not designated elsewhere, 10,000.

Bars: tree cutting, 8000; silicomanganese flats, 4000; flats, 6 in. and under, 5000; bar mill sections, 10,000; reinforcing, 4000; bolt and nut, 10,000.

Tube materials: round and gothics, 30,000; strip and skelp, 10,000.

Tin Plate

. . . Mills expected to run at near capacity all year

The 26,000 or more tons a month of tin plate requested by the British over the next 12 months, which is soon to be allocated to various American steel makers on the basis of their tin plate capacity, will undoubtedly create major production difficulties if an attempt is also made to fill total domestic requirements.

Evidence is clear that tin plate mills will operate at virtual capacity throughout the rest of the year. Fresh bookings have fallen off some but this is due to large consumers having already sent in specifications for most of their 1941 requirements. Can company inventories are said to be not excessive.

CHICAGO producers expect operations to continue at the current high level beyond the normal peak since they consider it a foregone conclusion that Great Britain's exports to South America and allied countries will be taken over by this nation's mills.

Tubular Goods

. . . 156,000 tons awarded for two lines . . 400,000 tons may be needed for another

Standard Oil Co. of New Jersey has allocated one of the largest pipe line orders in some time, approximating 156,000 tons of pipe, the majority of which is 12¾ in. About 118,000 tons of the order is for a line to run from Baton Rouge, La., to Greensboro, N. C., and Atlanta, Ga. The balance of the order covers about 38,000 tons of pipe for a line to run from Portland, Me., to Montreal, Que. Both lines are in the nature of a national defense project and are to be expedited with all possible haste.

The long line will be a product line capable of transmitting gasoline, crude oil, fuel oil, and other such products. Companies which will produce this large pipe order are: National Tube Co., Republic Steel Corp., Jones & Laughlin Steel Corp., Youngstown Sheet & Tube Co., and Spang Chalfant division of National Supply Co., Pittsburgh. It is expected that finished oil products will be running through the lines within five to six months. The long line will be known as the Plantation pipe line and will be operated jointly by the Standard Oil of New Jersey and Shell Oil.

Still in the tentative stage but with a possibility that definite action might be taken soon, is a 1500-mile crude oil line from Texas to the Atlantic Coast. Such a line, it is understood, will, if it materializes into a firm order, be one of the largest projects ever handled by the pipe industry. Pipe sizes being mentioned range from 22 to 24 in. and, with a heavy wall subject to considerable pressure due to sending crude oil such a long distance, the pipe order could run to more than 400,000 tons. Main reason for believing such a line is necessary stems from the loss of oil tankers from regular service to New Jersey refineries. It is held by some

interests that further withdrawals of oil tankers will leave New Jersey refineries short of crude oil, hence this 1500-mile line is receiving considerable and serious attention from oil companies and government officials.

Reinforcing Steel

. . . Awards of 5350 tons, lower than week ago

Reinforcing steel awards of 5350 tons are lower than last week, and include no letting for more than 900 tons.

New reinforcing steel projects are slightly higher than a week ago. The largest new jobs reported are 2000 tons for a Yorktown mine depot at Norfolk, Va.; 2000 tons for a Navy Yard pier at Bremerton.

Railroad Buying

. . . More than 7000 cars and 32 locomotives ordered

The two freight car building shops, reported in THE IRON AGE recently as being shut down because of inability to obtain steel supplies, have so far gained no relief, owing to the dilly-dallying in Washington over the question of granting formal preference ratings to freight car material. The situation with regard to the three other car shops which were reported by THE IRON AGE as facing a shutdown some time in June if material is not forthcoming, remains unchanged. Steel companies are being forced to grant priority on ship plates first.

At the same time, more new freight cars are on order now than at any time in the past 16 years. The Association of American Railroads announced that on May 1, Class I railroads had 56,502 new freight cars on order. Since then, however, preliminary reports received by the association indicate that orders are to be placed in the immediate future for 16,225 additional freight cars. All of these new cars are expected to be completed and placed in service this year.

Taking into consideration the 24,284 new freight cars which were placed in service in the first four months, this means that approximately 97.000 new cars will have been completed and installed in service within 1941. The railroads also put 159 new locomotives in service in the first four months of 1941. In the same period last year 115 new locomotives were installed.

Railroad equipment orders last week included more than 7000 cars and 32 locomotives.

Southern bought 1900 50-ton box cars, gondolas and 500 70-ton flat cars from Mt. Vernon Car Mfg. Co., 1500 50-ton box cars from Pullman-Standard Car Mfg. Co., and 25 express baggage cars from the St. Louis Car Co.

New York Central placed an order for 3000 55-ton box cars with Despatch Shops, Inc., and is inquiring for 15 4-8-2 freight locomotives and 15 diesel-electric switches of 350 to 600 hp.

Missouri Pacific has bought 100 auto part cars from American Car & Foundry Co. and Lehigh & New England took 15 70-ton cement cars from this builder, while inquiring for between 200 and 500 center dump cars.

Southern Pacific ordered four 200-ton flat cars from Mt. Vernon Car Co. and the Boston & Maine will build four 90-ton depressed center cars.

New York, New Haven & Hartford has ordered five 4000-hp. diesel-electric locomotives for passenger and freight service from American Locomotive Co. and six 44-ton diesel-electric switches from General Electric Co.

General Electric is building eight small diesel-electric units between 44 and 70-ton weight, two for the Steelton & Highspire and one for each of the following: East Erie, commercial; Arcade & Attica; Minneapolis, St. Paul & Sault Ste. Marie; Denver & Rio Grande Western; Missouri & Illinois Bridge & Belt; Alabama, Tennessee & Northern.

U. S. Army has on order eight light diesel-electric switches with General Electric, five 2-6-2 steam locomotives with the American Locomotive Co. and is asking for bids on one 70-ton diesel-electric unit.

For Great Northern, directors approved of a program calling for the buying of 17 diesel-electric switching locomotives.

Delaware, Lackawanna & Western is reported to be contemplating the purchase of 1000 box and 500 gondola cars.

Semi-Finished Steel

. . . Non-integrated mills find supplies harder to obtain

Even before steel mills have been able to rectify the effect of the coal strike, the steel industry faces the possibility of a second shutdown.

CLEVELAND producers have been conducting a vigorous drive for some time toward the conservation of semi-finished steel supplies for their own mills. Thus, non-integrated steel producers find ample supplies more and more difficult to obtain.

Merchant Bars

. . . Non-defense consumers face further delays

Deliveries are becoming further extended. Consumers with non-defense orders are facing curtailment or postponement of shipments, a situation that will grow worse with the placing of large pending orders for shell steel. The volume of new business has fallen off at PITTSBURGH recently but continues well above total shipments.

Reports that 600,000 tons of steel are to be ordered for one size shell alone came to CHICAGO producers this week. A major portion of the total shell steel tonnage will go to that district. Shell orders now have reached a sizable total. Alloy bar business is very active.

Coke

. . . Laclede fuel taken off domestic market

Coke produced by the Laclede Gas Light Co., St. Louis, has been taken off the market for domestic use, and will be sold for operation of the Granite City Pig Iron Co. blast furnace to be put in blast this summer. Use of Laclede fuel at the blast furnace will avoid a long delay which would be necessary to put into condition old coke ovens of the Granite City plant.

The by-product foundry coke price at CLEVELAND is now $12.30 a net ton, an advance of 25c. over the price quoted from May 1 to 19 by some sellers, and 75c. per ton over the April level. The leading seller took no action toward changing its April price until May 19.

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

NEW YORK, May 20.—With the price element largely removed from the non-ferrous markets by government action, interest currently centers on the supply problem. A number of new avenues are being explored in an effort to enlarge zinc and copper supplies but it is doubtful if these efforts will materialize into any important contribution to the supply situation for some time yet. With all available output of the Latin American copper mines contracted for, defense officials are turning again to the question of utilizing the high cost domestic mines. The OPACS last week requested the Arizona Department of Mineral Resources to determine how the rate of production from the high cost mines would be affected by an increase in the present price of 12c. a lb. This subject has been under study on and off for some time, but in view of the fact that despite the use of large amounts of foreign copper a shortage still threatens in copper, it is believed that this latest move presages definite action to bring these high cost units into the picture. Should it be decided that a higher price might spur output at these mines, it is unlikely that the general price level would be affected.

Marketwise, the copper was little changed in the past week. Demand is still controlled by restrictions imposed by sellers and prices remain unaltered at 12c. a pound, Valley, quoted by producers and 12½c. by custom smelters.

Zinc

Prospect of an increase in amount of zinc going monthly into the defense emergency pool highlighted developments in the spelter market in the past week. The May allotment amounted to 17 per cent, while as much as 25 per cent, or about 15,000 tons, may be required in June. Should this increase in pool requirements materialize, it would represent another step in the curtailment of supplies available for non-defense use. Meanwhile, expansion of domestic zinc production continues. The new facilities of the slab producing facilities of American Zinc, Lead & Smelting Co., at Fairmont City, have been completed and capacity production from this new plant will be reached by June. Buying of zinc continues to be a routine affair while acceptance of orders limited largely to defense needs. Prices are unaltered at 7.64c. a lb., New York, and 7.25c., East St. Louis.

Lead

Although total sales in the past week showed a drop of about 20 per cent from the heavy volume of the preceding week, this decline was more a reflection of the fact that production through June has already been largely sold, rather than to any slackening in consumer desire to place new orders.

Tin

Demand for tin in the past week continued at an active pace and prices held steady and unchanged at 55½c. a lb., New York. With the Metals Reserve Co. unable to add to its commitments as long as the market price exceeds 50c. a lb., the Navy Department has been acquiring an average of 250 tons a week for the past four weeks at prices averaging slightly below 52c. a lb. Thus, while the MRC is temporarily unable to expand its activities, the government is still actively acquiring supplies of this vital metal. The purchases of the Navy have acted to restrict still further the amount of metal available to the open market.

(Non-ferrous prices on page 135)

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Production Up Over 100%

Chicago

• • • **Builders in this area** greeted calmly the announcement in Cleveland that the industry would have to add about $500,000,000 worth of new business on top of present orders—all to be delivered by July 1, 1942. "The way we're going now we can do it" is the general consensus here. For proof they cite such examples as these of production increases for today compared to a year ago: Giddings & Lewis —over 100 per cent; Barnes Drill —about 300 per cent; Sundstrand Machine Tool—about 75 per cent; Rockford Machine Tool—over 100 per cent. These figures are all approximate and are cited as typical of the industry in this section.

After a brief slump in orders, a freshet of new business is again pouring in to pile up backlogs higher.

Management of most firms currently lean toward granting of vacations to shop men, despite OPM's request to the contrary. A few are even thinking of shutting down for vacations, while vast majority lean toward freely granting layoffs to men who want them. Agreement is that machine tool labor is very tired, actually needs rest to increase production and efficiency. Some firms who tried working 12-hr. daily shifts found production no better than that of 10-hr. day due to fatigue. Practically all companies now work 21 or 22 hr. a day, six days a week. Hardly anyone feels that the President's request for a seven-day week can be met. "We just haven't got the extra men to put on and our present forces can't work 70 hr. a week and do a good job."

Industry at 40% of Bogey

Cincinnati

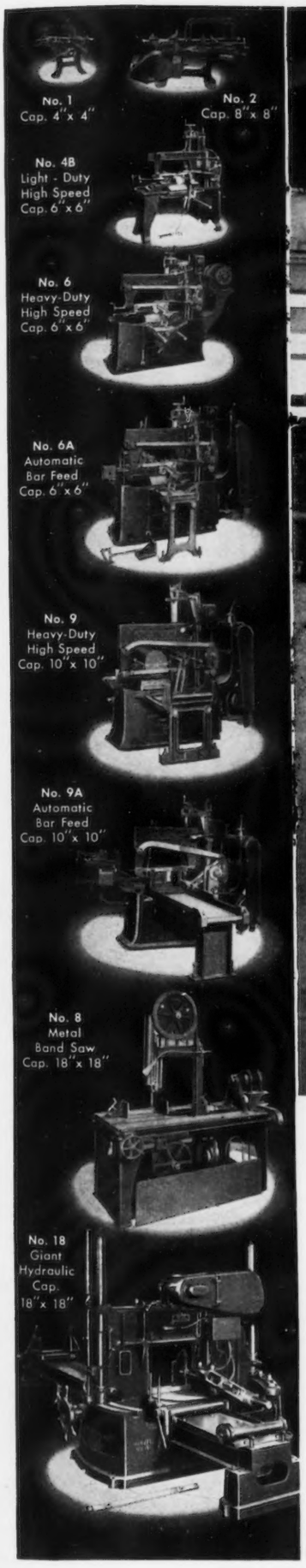
• • • **The machine tool industry** at Cincinnati is operating only at 40 per cent of capacity, based on the President's request for 24 hr. operation, seven days a week, which would mean a work week of 168 hours. A recent survey just completed by Clifford L. Schulte, area manager of the Defense Control Service of OPM, showed that the machinery builders were operating an average of about 60 hr. a week. One or two plants are operating two shifts a day, 132 hr. a week, and they claim they are eliminating a lot of loss and delay resulting from shift changeover, should they go to a three-shift basis. Mr. Schulte admits that a definite labor shortage is present and that in his opinion it would be difficult for the industry to operate efficiently on a 168 hr. week under the present labor supply.

Small Tools and Gages Tight

Cleveland

• • • **Growing more intense** is the overwhelming demand for gages and small tools that has existed ever since the war in Europe broke out. Considerable new production capacity is coming into use, including a large new plant at Dayton, but still delivery promises are going backward even on some of the more common items like plug gages. Attempts to borrow badly needed items are widespread.

At the same time, orders for reamers, cutters, taps, etc., are soaring. In addition to the thousands of new machine tools being placed in service, new operators are using more than the average of small tool equipment. Extended deliveries on steel are said occasionally to be contributing to long delivery promises. The demand for small tools is expected to be intensified by the proposed new specifications for tapered pipe threads for aircraft, reported being adopted in an effort to overcome failures and leakage.



In constant service 48 hours per week at the Gould & Eberhardt plant, Irvington, N. J.

● Purchased by Gould & Eberhardt, Irvington, N. J., manufacturers of gear cutting machines and shapers, to speed up cutting-off from bar stock on various grades of steel up to 6" in diameter, this MARVEL 6A high speed Production Saw has been operating 48 hours per week since installation over a year ago. When photographed it was automatically cutting identical lengths from "Maxwell" #3½ hot rolled natural steel 2⅝" diameter. The actual cutting time per piece, using a 6 tooth MARVEL High-Speed-Edge Hack Saw Blade, was 1 minute 15 seconds per piece.

ARMSTRONG BLUM MANUFACTURING CO.

"The Hack Saw People"

5700 Bloominadale Ave. Chicago, U.S.A.

Eastern Warehouse & Sales: 199 Lafayette St., New York, N. Y.

MARVEL SAWS

Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

Scrap trading in the past week, the first full week of operation under the new maximum price schedule, was marked by a sharp letdown in the movement of material into consumption. While a large share of the decline is attributed to the general confusion surrounding the change-over to the new market conditions, many scrap interests believe the scrap movement under present prices will not again approach the levels reached last fall under the higher prices prevailing then.

The general attitude, however, is to give the new schedule a fair trial. Hence the next 30 to 60 days will be an extremely critical period for both consumers and dealers. If by the end of that period, sufficient scrap is not flowing, more drastic action by the Government is expected. In any event, it appears at the moment that, outside of minor adjustments for the purpose of alinement, it is unlikely that the maxima of the present schedule will be increased

A number of ambiguities still exist in the new price schedule, and these have been drawn to the attention of OPACS. It is probable that in an effort to clear up some of the uncertainties surrounding interpretation of the schedule the price division will issue shortly a detailed explanatory statement.

The British Iron & Steel Corp. has tentatively allocated its May scrap requirements, totaling about 75,000 tons, among a number of dealers. Quotations ruling on this material vary according to the port of shipment, but are above the export maximums set in the May 7 price order in so far as northeastern ports are concerned.

The cast scrap situation is especially acute at present.

The government schedule of maximum prices of iron and steel scrap were published in the May 15 issue of The Iron Age and are not repeated this week. The prices will be reprinted in the event of any changes in the schedule.

Pittsburgh

Although some transactions under the new scrap setup continue here, tonnages involved are not large. Dealers' accumulations were fairly well cleaned up in the rush to ship old business prior to May 10. Clarifications are still being sought on the new scrap order.

Philadelphia

Trading in scrap in this district under the new maximum prices has dropped sharply from the level holding previous to May 10. Shipments from the smaller yards have declined as much as 50 per cent. While one or two mills are in a fairly comfortable position with respect to scrap stocks, a majority of the district consumers are seriously concerned over the decline in shipments. Cast material is especially difficult to obtain and there is reported to be some confusion over grade specifications. The British have tentatively allocated their May requirements, totaling some 75,000 tons, at prices varying according to port of shipment. Some of the prices prevailing on this export business have been set, with government approval, above the levels established in the May 7 scrap price order.

Chicago

Quiet that pervades market here is likely to continue through the summer. Transactions are at a minimum and mills are getting just about as much scrap as they consume. Informed sources contend there is enough scrap to round out the year.

Youngstown

It may be too early to make a conclusive statement, but the flow of scrap to this district seems to have been retarded recently. For the most part buyers and dealers are awaiting the interpretation of many problems presented by the revised schedule and regulations of the OPACS.

Cleveland

Orders have been placed here on the new basis conceived at Washington, but it is said scrap is coming out slowly. Some of the confusion apparent last week has subsided. However, there are many questions still in the air.

Buffalo

Approximately 35,000 tons of No. 1 and No. 2 heavy melting scrap have been sold into consumption here since the establishment of the revised price schedule.

St. Louis

There is still considerable confusion in the minds of St. Louis buyers and sellers of scrap because of differentials from basing points as fixed by the government. As a result there has been very little buying, the mills taking small tonnages that dealers pick up. Dealers complain that the differentials are working a hardship on St. Louis, diverting tonnages to other sections.

Birmingham

The government's price revisions on scrap have increased uncertainty in the market here. Transactions are few and movement of material into the district is slow.

Cincinnati

Many inequalities in the present scrap prices have brought deep concern to dealers here. This is particularly true of cupola items and stove plate which have placed the Southern Ohio district at a disadvantage. Differentials between Southern Ohio and Pittsburgh is $6 and dealers indicate that their normal sources of supply have diverted this material to the Pittsburgh area where a broader profit is possible. As a result, although there is a broad demand for all types of scrap in this area, dealers are unable to meet that demand because of inability to purchase the scrap at present controlled prices. Some of the rulings on the price situation have so confused dealers that in some instances they are refusing business rather than to accept it at the peril of having misinterpreted their rights under the government setup.

Detroit

The local scrap trade is seeking interpretation of the regulations recently issued and is having considerable difficulty in doing so. While it is still generally reported that certain items are selling at prices under the government maximum, the volume of transactions has been small and erratic and it is virtually impossible to draw a conclusion.

New York

Following completion of contracts on May 10, scrap has been slow in coming out. Dealers and brokers contend that New York should have been included in the scrap price schedule, considering its importance as a scrap producing area. No. 1 steel is now quotable at $15.33 a ton and No. 2 at $14.33, f.o.b. New York for shipment to Eastern Pennsylvania.

Boston

Although considerable confusion exists regarding commissions, split commissions and extra commissions, business is slowly gathering momentum. It is, however, largely confined to carlots. Steel turnings have stopped going to Phoenixville because of labor trouble there, but are going to Johnstown and Bethlehem at $9.56 a ton f.o.b. and busheling material to eastern Pennsylvania, Pittsburgh and Johnstown at $13.56 a ton f.o.b. The American Steel & Wire Co., Worcester, Mass., is buying No. 1 heavy melting steel at $14.66 a ton f.o.b.

U. S. Steel Exports for March Decline to 567,227 Tons

• • • **Steel exports declined** slightly in March as compared with February. Value of the material shipped was, however, greater according to preliminary figures released by the Durable Materials Unit of the Bureau of Foreign and Domestic Commerce. March exports totaled 512,844 gross tons valued at $37,332,776, a decline of 2.5 per cent in quantity from the February trade of 525,862 tons valued at $34,637,943, but still well above the 457,052-ton, $34,220,853 trade of March 1940.

Cumulative exports, despite the steadily downward trend manifest over the entire January-March period, at 1,692,504 tons valued at $111,661,722 were greater than the shipments of the comparable period of 1940—1,289,701 tons valued at $98,735,419—by 31.3 per cent in quantity and 13.1 per cent in value.

Trade with South America, the Far East, and Africa increased in March as compared with February—shipments to the first named area rising to 72,183 tons from 68,177 tons, to the second to 65,582 tons from 55,359 tons, and to the third to 47,171 tons from 34,102 tons. The trade with Europe declined—to 222,316 tons from 260,682 tons—while that with the countries of North and Central America and the West Indies was only slightly lower at 105,592 tons against 107,542 tons.

As in recent months the United Kingdom took the lion's share of the iron and steel exports—213,673 tons—including 110,712 tons of non-alloy and 25,281 tons of alloy ingots, blooms, billets, etc., and 25,020 tons of pig iron. Second place went to Canada whose purchases totaled 75,273 tons including 14,724 tons of black steel sheets, 8271 tons of non-alloy plates, and 7932 tons of non-alloy ingots, blooms, etc.

IMPORTS
March, 1941
(Gross tons)

Pig Iron—None
Iron Ore—181,554 tons
- Canada 8,996
- Mexico 278
- Cuba 19,600
- Chile 152,680

Manganese Ore (35% and over)—49,453 tons
Battery grade—2112 tons
- Netherlands Indies 292
- Gold Coast 1,820

Other—47,341 tons
- Spain 1,625
- Mexico 43
- Cuba 8,629
- Brazil 13,844
- British Indies 6,042
- Netherlands Indies 286
- Philippine Islands 6,170
- Union of South Africa 1,727
- Gold Coast 8,975

IMPORTS

March		Three Months Ended March			
1941	1940	1941	1940		
....	583	....	4,529	Pig iron	
....	853	11	4,640	Ferromanganese and Spiegeleisen[1]	
114	63	204	372	Ferrochrome and ferrosilicon[1]	
....	14	....	164	Other ferroalloys[1]	
....	69	23	241	Sponge iron	
5,401	29	5,568	744	Scrap: iron, steel, tin plate	
5,515	*1,611*	*5,806*	*10,690*	*Pig iron, ferroalloys and scrap*	
55	135	55	361	Ingots, blooms, billets, sheet bars	
*	....	....	....	Ingots, etc.: stainless, other alloy	
*	....	....	....	Skelp	
66	930	87	2,466	Wire rods	
121	*1065*	*142*	*2,827*	*Semi-finished steel*	
2	29	4	57	Sheets, black iron and steel[2]	
*	....	....	....	Sheets, galvanized iron and steel	
*	....	....	....	Sheets, alloy steel	
*	....	....	....	Sheets, stainless	
....	2	4	4	Plates, plain and fabricated	
*	....	....	....	Plates, alloy	
*	....	....	....	Plates, stainless	
23	479	60	1,027	Bars, merchant and reinforcing	
15	34	15	158	Bars, iron[3]	
*	....	....	....	Bars, alloy steel	
*	....	....	....	Bars, stainless	
61	186	80	571	Bars, hollow steel	
....	102	....	459	Hoops, bands, strips, cotton ties	
*	....	....	....	Hoops, bands, strip: alloy steel	
*	....	....	....	Hoops, bands, strip: stainless	
*	....	....	....	Piling, sheet	
....	235	....	534	Structural shapes	
24	....	67	....	Structural material, fabricated[4]	
4	12	26	26	Tin plate, terne plate, taggers' tin	
*	....	....	....	Tanks, steel	
*	....	....	....	Pipe, welded iron and steel	
73	612	414	1,217	Casing and oil line pipe	
*	....	....	....	Boiler tubes	
....	170	24	490	Wire, round iron and steel, telephone	
31	97	71	260	Wire rope, strand, other products	
....	....	....	....	Wire barbed, woven products	
162	336	450	803	Wire flat, all other types	
3	21	7	66	Nails, tacks and staples	
6	53	10	77	Bolts, nuts, rivets, washers, etc.	
209	2	228	297	Rails and track material	
....	2	....	8	Die blocks or blanks, etc.	
....	....	....	3	All other finished steel	
613	*2,372*	*1,460*	*6,957*	*Rolled and finished steel*	
....	....	....	419	Cast iron pipe and fittings	
*	....	....	....	Malleable iron pipe fittings	
24	48	84	117	Casting, forgings: iron and steel	
*	....	....	....	Castings, forgings: alloy and stainless	
*	....	....	....	Carwheels and axles	
24	*48*	*84*	*536*	*Castings and forgings*	
6,273	5,096	7,492	20,110	Total	

EXPORTS

March		Three Months Ended March		
1941	1940	1941	1940	
27,464	26,146	154,629	60,130	Pig iron
308	301	1,115	5,778	Ferromanganese and Spiegeleisen[1]
1,177	....	5,317	.....	Ferrochrome and ferrosilicon[1]
648	479	1,426	1,699	Other ferroalloys[1]
*	.....	.....	.....	Sponge iron
54,383	206,928	173,816	629,101	Scrap: iron, steel, tin plate
83,980	*233,854*	*336,303*	*696,798*	*Pig iron, ferroalloys and scrap*
124,956	80,874	441,491	204,862	Ingots, blooms, billets, sheet bars
33,947	285	129,706	4,170	Ingots, etc.: stainless, other alloy
15,941	2,420	37,310	14,343	Skelp
11,184	19,124	34,631	42,836	Wire rods
186,028	*102,703*	*643,138*	*266,211*	*Semi-finished steel*
37,017	50,051	108,926	124,233	Sheets, black iron and steel[2]
11,273	15,390	30,427	48,550	Sheets, galvanized iron and steel
775	636	1,860	1,653	Sheets, alloy steel
167	176	295	568	Sheets, stainless
37,640	34,676	130,948	97,521	Plates, plain and fabricated
390	148	1,143	704	Plates, alloy
14	51	140	64	Plates, stainless
47,156	56,526	139,267	149,348	Bars, merchant and reinforcing
831	2,651	1,138	6,276	Bars, iron[3]
4,774	2,193	13,522	5,118	Bars, alloy steel
86	65	202	203	Bars, stainless
*	.....	.....	.....	Bars, hollow steel
11,834	17,167	42,871	48,770	Hoops, bands, strips, cotton ties
146	134	302	225	Hoops, bands, strip: alloy steel
46	59	148	195	Hoops, bands, strip: stainless
477	238	2,803	2,222	Piling, sheet
22,980	16,751	94,744	44,288	Structural shapes
9,620	5,607	19,856	19,446	Structural material, fabricated[4]
20,672	44,904	45,336	170,874	Tin plate, terne plate, taggers' tin
1,077	2,380	7,429	5,872	Tanks, steel
12,603	8,290	29,871	27,298	Pipe, welded iron and steel
9,855	16,833	23,516	56,259	Casing and oil line pipe
4,515	2,126	12 260	6,317	Boiler tubes
6,048	9,238	15,711	23,551	Wire, round iron and steel, telephone
769	1,172	3,903	2,935	Wire rope, strand, other products
7,514	2,725	14,366	8,134	Wire barbed, woven products
9,943	10,161	26,679	29,001	Wire flat, all other types
1,242	569	2,600	1,466	Nails, tacks and staples
3,948	1,199	10,059	3,465	Bolts, nuts, rivets, washers, etc.
18,241	15,157	63,296	37,043	Rails and track material
*	.....	.....	.....	Die blocks or blanks, etc.
1,805	2,128	11,118	6,415	All other finished steel
283,458	*319,395*	*854,736*	*928,014*	*Rolled and finished steel*
6,851	2,579	13,344	13,786	Cast iron pipe and fittings
396	392	1,240	1,406	Malleable iron pipe fittings
4,835	2,486	2,230	7,336	Casting, forgings: iron and steel
676	596	2,023	1,376	Castings, forgings: alloy and stainless
1,003	1,975	3,306	3,965	Carwheels and axles
13,761	*8,028*	*32,143*	*27,869*	*Castings and forgings*
567,227	663,980	1,866,320	1,918,802	Total

[1] In imports the tonnage shown is the alloy content—the manganese, chromium, and silicon content, as the case may be. [2] Imports include skelp and saw plate. [3] Import figures include iron slabs. [4] Imports include sashes and frames only.
* No separate figures.

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings of 22,200 tons slightly lower than a week ago; new projects drop to 10,200 tons from 33,600 tons; plate awards only 450 tons.

AWARDS

NORTH ATLANTIC STATES

1900 Tons, Allegheny County, Pa., State highway bridge, to American Bridge Co., Pittsburgh.

1526 Tons, New York, public school No. 120, to Harris Structural Steel Co., Plainfield, N. J., Depot Construction Co., New York, contractor.

600 Tons, Philadelphia, extension to cast house, Midvale Steel Co., to Bethlehem Steel Co., Bethlehem, Pa.

525 Tons, Danvers, Mass., Hygrade Sylvania Co. building, to Harris Structural Steel Co., Plainfield, N. J.

500 Tons, Camden, N. J., gates, New York Shipbuilding Co., to Lehigh Structural Steel Co., Allentown, Pa.

365 Tons, Niagara Falls, N. Y., addition to main plant, Carborundum Co., to F. L. Heughes Co., Rochester, N. Y.

300 Tons, Pine Camp, N. Y., airplane hangar, to R. S. McMannus Steel Construction Co., Buffalo, through John W. Cowper Construction Co., Buffalo.

300 Tons, Hartford, Conn., bridge, to Harris Structural Steel Co., Plainfield, N. J.,

300 Tons, Union County, Pa., State highway bridge, to Phoenix Bridge Co., Phoenixville, Pa.

260 Tons, Springfield, Mass., power house, to Haarman Steel Co., Holyoke, Mass.

250 Tons, Philadelphia, battery storage building, Navy Yard, to Lehigh Structural Steel Co., Allentown, Pa.

220 Tons, Brooklyn, kitchen building for Kings County Hospital, to Schacht Steel Construction Co., New York.

200 Tons, Mercer County, Pa., State highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

165 Tons, Gardiner, N. Y., Herrick building, to American Bridge Co., Pittsburgh.

165 Tons, Washington, metal storage building, to an unnamed bidder.

100 Tons, Cambridge, Mass., Radcliffe College music building, to a Boston fabricator.

100 Tons, Wilmerding, Pa., building extension for Westinghouse Air Brake Co., to Ingalls Iron Works Co., Pittsburgh plant.

THE SOUTH

1100 Tons, Strawberry Plains, Tenn., transmission towers for TVA, to American Bridge Co., Pittsburgh.

680 Tons, Richmond, Va., additions to rayon plant, E. I. du Pont de Nemours & Co., to Harris Structural Steel Co., Plainfield, N. J.

225 Tons, Norfolk, Va., four Navy gantry cranes, to Fort Pitt Bridge Works Co., Pittsburgh, through R. W. Kaltenbach Corp.

CENTRAL STATES

1500 Tons, Jeffersonville, Ind., two warehouses, to Inland Steel Co., Chicago.

775 Tons, Columbus, Ohio, sheds for Army depot, to Mount Vernon Bridge Co., Mount Vernon, Ohio.

510 Tons, Wood County, Ohio, State highway bridge, to American Bridge Co., Pittsburgh.

500 Tons, Columbus, Ohio, renovating plant for Army depot, to Bethlehem Steel Co., Bethlehem, Pa.

350 Tons, Elyria, Ohio, addition for Western Automatic Machine Screw Co., to Fort Pitt Bridge Works Co., Pittsburgh.

300 Tons, Scioto County, Ohio, State highway bridge, to American Bridge Co., Pittsburgh.

300 Tons, Muskegon, Mich., ball plant for Brunswick-Balke-Callender Co., to Muskegon Fabricators, Muskegon, Mich.

150 Tons, Cincinnati, Ohio, crane runway for Cincinnati Milling Machine Co., to Ingalls Iron Works Co., Birmingham.

100 Tons, Franklin County, Ohio, State bridge, to an unnamed bidder.

WESTERN STATES

4000 to 5000 Tons, Sitka and Kodiak Island, Alaska, Navy aviation facilities, to Columbia Steel Co., San Francisco, through Siems-Drake-Puget Sound Co., Seattle, contractor.

160 Tons, Douglas, Wyo., Antelope Creek State bridge FAP-209-C (5), to American Bridge Co., Pittsburgh.

140 Tons, San Diego, Cal., 11 Marine Corps storehouses, Kearney Mesa, to Pacific Iron & Steel Co., Los Angeles, through Los Angeles Contracting Co., and O. W. Karn, contractors.

HAWAII

3000 Tons, Pearl Harbor, T. H., aviation facilities, to Columbia Steel Co., San Francisco.

BRITISH WEST INDIES

100 Tons, Antigua, tender pier, to Ingalls Iron Works Co., Pittsburgh plant.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

2200 Tons, Pittsfield, Mass., gun director building for General Electric Co.; Stone & Webster Engineering Co., contractor.

600 Tons, Middletown, Pa., airport buildings.

520 Tons, New York, Department of Docks, seaplane hangar at LaGuardia Field; Harris Structural Steel Co., New York, low bidder.

500 Tons, New Cumberland, Pa., Army quartermaster's building.

350 Tons, Philadelphia, store at 13th and Market Streets.

250 Tons, Centre County, Pa., highway bridge, route No. 219.

250 Tons, Syracuse, N. Y., field artillery armory; A. E. Stephens Co., Springfield, Mass., general contractor.

215 Tons, Devon, Conn., generating station extension for Connecticut Light & Power Co.

155 Tons, Silver Spring, Md., Shepherd dial center for Chesapeake & Potomac Telephone Co.

125 Tons, Providence, R. I., Broad Street bridge.

115 Tons, Cranston, R. I., bridge No. 160 for New York, New Haven & Hartford Railroad Co.

110 Tons, Elmira, N. Y., city bridges.

THE SOUTH

300 Tons, Farmers, Ky., Licking River State bridge.

165 Tons, Norfolk, Va., James River bridge for Seaboard Air Line Railway.

CENTRAL STATES

525 Tons, Chicago, State Street subway stations.

500 Tons, Saginaw, Mich., extension to building No. 5 for Saginaw Malleable Iron Division, General Motors Corp.

410 Tons, Falls City, Neb., bridges FAS-51-A and B.

200 Tons, Jefferson Barracks, Mo., mess hall, boiler house and cold storage building, Dickie Construction Co., St. Louis, low bidder on general contract.

200 Tons, Wood River, Ill., Standard Oil Co. of Indiana buildings; Dravo Corp., general contractor.

150 Tons, Cleveland, building for Tremco Mfg. Co.

125 Tons, Kansas City, Mo., repairs to bridge No. 0.88 for Union Pacific Railroad.

WESTERN STATES

900 Tons, Friant, Cal., drum gates for Friant Dam (Specifications 963); bids June 13.

550 Tons, Seattle, Boeing Aircraft Co. camouflage paint building; Austin Co., Seattle, contractor.

500 Tons, Granby, Colo., tunnel supports, Colorado-Big Thompson project (Invitation C-46,061-A); bids May 26.

375 Tons, San Francisco, Randolph telephone exchange; Moore Dry Dock Co., Oakland, Cal., low bidder.

115 Tons, Eureka, Cal., Eureka Slough bridge; bids June 11.

FABRICATED PLATES

AWARDS

450 Tons, Lackawanna, N. Y., tar tank for Bethlehem Steel Co., to Bethlehem Steel Co., Bethlehem, Pa.

PENDING PROJECTS

750 Tons, Kremmling, Colo., penstocks and outlet pipes, Green Mountain Dam (Specifications 964); bids June 16.

SHEET PILING

PENDING PROJECTS

500 Tons, Bremerton, Wash., Navy Yard pier; A. W. Quist Co., and Sound Construction Co., Seattle, contractors.

Weekly Bookings of Construction Steel

Week Ended →	May 20, 1941	May 13, 1941	Apr. 22, 1941	May 21, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	22,200	22,500	35,800	10,620	647,410	283,680
Fabricated plate awards	450	735	1,375	1,910	67,565	55,095
Steel sheet piling awards	0	1,580	1,080	0	16,755	16,190
Reinforcing bar awards	5,350	13,685	14,710	13,150	266,290	162,450
Total Letting of Construction Steel	28,000	38,500	52,965	25,680	998,020	517,415

Reinforcing Steel

Awards of 5,350 tons; 11,500 tons in new projects.

AWARDS

ATLANTIC STATES

126 Tons, Hartford, Conn., maternity hospital building, to Truscon Steel Co., Youngstown, through Central Cement Finishing Co.

SOUTH AND CENTRAL

900 Tons, Huntington, W. Va., U. S. Engineers, two pumping stations, to West Virginia Rail Co., Huntington.

600 Tons, Ashland, Ky., blast furnace for American Rolling Mill Co., to Pollak Steel Co., Cincinnati, through Arthur G. McKee.

500 Tons, Weldon Springs, Mo., ordnance plant foundations, to Truscon Steel Co., Youngstown, through Fraser, Brace Engineering Co., Inc.

450 Tons, Chicago, office building addition, Spiegel, Inc., to Inland Steel Co., Chicago, through Campbell-Lowrie & Lautermilch, contractors.

387 Tons, Watson, Ind., underground magazines, to Truscon Steel Co., Youngstown, through Missouri Valley Bridge & Iron Co., and Sollitt Construction Co.

360 Tons, Chicago, addition, Victor X-ray Co., to Bethlehem Steel Co., Bethlehem, Pa., through James Stewart Co.

300 Tons, Madison, Ind., airport, to Laclede Steel Co., St. Louis, through O'Connor & Simmons.

250 Tons, Chicago, Commonwealth Edison Co. utility building, to Bethlehem Steel Co., Bethlehem, Pa.; Herlihy Mid Continent Co., contractor.

232 Tons, Boulevard, Fla., State road, project No. 5367, to Truscon Steel Co., Youngstown.

160 Tons, Chicago, Brinks Express Co. warehouse, to Joseph T. Ryerson & Son, Inc., Chicago.

WESTERN STATES

440 Tons, Longview, Wash., Reynolds Metal Co. plant, to Truscon Steel Co., Youngstown, through Austin Co., Cleveland.

250 Tons, Selma, Cal., Burbank winery, to Truscon Steel Co., Youngstown, through Trewhitt, Shields & Fisher.

200 Tons, Taft, Cal., Lincoln School auditorium, to Ceco Steel Products Co., Los Angeles, through Guy Hall, Bakersfield, Cal., contractor.

186 Tons, Concord, Cal., Central Valley project (Invitation 49,217-A-1), to Columbia Steel Co., San Francisco.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1200 Tons, Brooklyn, contract No. 7, Long Island Railroad.

700 Tons, Baltimore, Veterans' Hospital.

215 Tons, Berlin, Conn., bars and mesh, overpass; D'Arrigoni, Middletown, Conn., contractor.

185 Tons, Union, Conn., highway mesh; Onegla & Gervasini, Inc., Torrington, Conn., contractor.

175 Tons, Lackawanna, N. Y., municipal disposal plant addition.

150 Tons, Pittsfield, Mass., General Electric Co. Navy ordnance equipment plant; Stone & Webster Engineering Co., Boston, contractor.

SOUTH AND CENTRAL

2000 Tons, Norfolk, Va., Yorktown Mine depot.

1300 Tons, Yorktown, Va., bridge over York River.

1200 Tons, Stickney, Ill., sewage treatment works, division J; bids May 22.

850 Tons, Paducah, Ky., flood wall, section B, unit 2.

300 Tons, Cleveland, Cleveland Graphite Bronze Co.

280 Tons, Norfolk, Va., naval base fuel pier.

WESTERN STATES

2000 Tons, Bremerton, Wash., Navy Yard pier; A. W. Quist and Sound Construction Co., Seattle, contractors.

440 Tons, Friant, Cal., Friant Dam (Invitation 48,826-A); bids in.

235 Tons, Eureka, Cal., Eureka Slough bridge; bids June 11.

132 Tons, Stanfield, Ore., Umatilla River overcrossing; bids May 22.

106 Tons, Granger, Wash., Yakima project (Invitation B-33507-A); bids in.

Cast Iron Pipe

Springfield, Mass., has awarded 684 ft. each of 12, 14, 16 and 20-in. pipe to United States Pipe & Foundry Co.

Windsor Locks, Conn., has awarded 450 tons of 6 to 12-in., inclusive, pipe to Warren Foundry & Pipe Corp.

Omro, Wis., will take bids soon for pipe lines for water system; also for other waterworks equipment. Cost about $125,000. Fund in that amount is being secured through Federal aid. Jerry Donohue Engineering Co., 608 North Eighth Street, Sheboygan, Wis., is consulting engineer.

Talco, Tex., plans pipe line extensions and replacements in water system; also other waterworks installation. Fund of about $149,000 is being arranged for this and sewage system. Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers.

Fostoria, Ohio, plans pipe line extensions in water system; also new storage reservoir, elevated steel tank and tower, pumping machinery and other waterworks installation. Cost about $250,000. D. E. Davis, 210 East Park Way, Pittsburgh, is consulting engineer.

Wilmington, N. C., plans extensions in water pipe lines, including extension in main 30-in. line to Kings Bluff and vicinity, to cost about $1,396,800 out of total of $2,340,720 to be arranged for entire project, with part of fund to be used for sewage system. It is proposed to call special election in June to vote bonds for last noted amount. Plans also are under way for extensions in pipe lines to Greenfield Lake, and to Dawson and Thirteenth Streets, for water supply for defense housing developments at these points. Cost about $85,000 including sewage lines.

Mount Zion, Ill., plans pipe lines for water system and other waterworks installation. Cost about $46,100. Special election has been called May 24 to approve bond issue in that amount.

Peninsula, Ohio, plans pipe lines for water system and other waterworks installation. Financing is being arranged through Federal aid. Carl J. Simon & Associates, Van Wert, Ohio, are consulting engineers.

Brattleboro, Vt., plans 10-in. pipe for extensions in main water lines. Cost close to $50,000.

United States Engineer, Los Angeles, has awarded 233 tons of 10-in. class 150 cast iron pipe to National Cast Iron Pipe Co., Los Angeles.

Wilbraham, Mass., has accepted a report on a water system, and will be in the market within a month for pipe.

Malden, Mass., is in the market for pipe fittings and water valves. Specifications are obtainable from city engineer.

Hartford, Conn., has awarded 10,000 ft. of cement lined 12 and 16-in. pipe, 20 tons of cement lined fittings and four tons of unlined fittings to United States Pipe & Foundry Co., Boston.

Shenandoah, Iowa, plans pipe line extensions and improvements, including about 4800 ft. of various sizes for new water lines. Financing is being arranged through Federal aid.

St. John (Lake County), Ind., R. R. Weaver, town clerk, will take bids soon for 300 ft. of 8-in. pipe; 9100 ft. of 6-in., 2300 ft. of 4-in., and 1000 ft. of 2-in., with cement-asbestos pipe as an alternate for certain lines; also for 60,000-gal.-elevated steel tank on 100-ft. tower; turbine-type, deep-well pumping unit, capacity of 150 gal. per min.; and meters, meter yokes, meter boxes, etc. Martin L. Burden, 103 Monroe Street, Alexandria, Ind., is consulting engineer.

Arlington, N. C., plans pipe lines for water system and other waterworks installation. Financing will be arranged soon for this and sewage system.

Burbank, Cal., has awarded 233 tons of 6, 8, and 10-in. pipe to National Cast Iron Pipe Co., Los Angeles.

Spokane, Wash., is reported to have awarded 950 tons of 4 to 12-in. pipe to Pacific States Cast Iron Pipe Co., Provo, Utah.

Pipe Lines

Youngstown Sheet & Tube Co. has been awarded contract for 38,000 tons of 12¾-in. pipe for a 250-mile line between Portland, Me., and Montreal.

Montana-Dakota Utilities Co., 831 Second Avenue South, Minneapolis, plans new welded steel pipe line from Bowes gas field, near Chinook, Mont., to Harlem, Mont., almost 30 miles, for natural gas transmission. New line will pass along Milk River valley area. H. M. Frederickson, first noted address, is assistant construction engineer.

Magnolia Pipe Line Co., Magnolia Building, Dallas, Tex., plans pipe line from oil field in northern part of Pecos County, Tex., to Halley, Tex., close to 55 miles, for crude oil transmission. Proposed to use 8-in. welded-joint, pressure cast iron pipe. Connection will be made with pumping station of company at last noted place. Booster pumping plants will be installed along route. Cost over $180,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 26 for 170,000 ft. of galvanized carbon steel pipe; also for 100 cast iron water pipe tees (Schedule 5126).

W. R. Davis, Inc., Commerce Building, Houston, Tex., has acquired properties of Valley Pipe Line Co., with main 5-in. welded steel pipe from Rincon oil field, Starr County, Tex., to Brownsville and Port Isabel, Tex., operating as a common crude oil carrier for several pools in oil district noted. New owner plans early removal of this line and installation of new 8-in. welded steel pipe line over same right-of-way to terminals noted, about 100 miles. Entire project, including acquisition of Valley company, will approximate $1,500,000. P. B. Watson is president of Davis company.

Oklahoma Natural Gas Co., 401 North Harvey Street, Oklahoma City, Okla., plans new 6-in. pressure pipe line from connection with main line in city to new air depot of United States Army, for natural gas transmission; also will install control and regulator station at latter point for local distribution. Cost over $45,000.

United States Engineer Office, Portland, Ore., asks bids until May 27 for pressure pipe lines for gasoline fueling system at airport at Boise, Idaho, including tanks and hydraulic displacement fueling system, fueling pits and accessories (Circular 492); also for installation of similar system at airport at Pendleton, Ore. (Circular 493).

Union Pipe Line Co., Shreveport, La., plans new pressure pipe line from gas field near DeQuincy, La., to Leesville, La., and vicinity, about 50 miles, for natural gas transmission. Proposed to use welded-joint, pressure cast iron pipe, with 20 miles of 10-in., and remainder 8 and 4-in. Booster station will be installed. Cost over $300,000.

Bureau of Reclamation has awarded 500,000 ft. of 1-in. black steel pipe or tubing, couplings, and gaskets to Mine & Smelter Supply Co., Denver, under Invitation 48,808-A.

Trade Notes

HPL Mfg. Co., specializing in small quantities of metal, fiber and other sheet material stampings, has been established at 2015 East 65th Street, Cleveland. The company was organized by Ray Hedburg, Kermit Peterson and Melvin Lorentz.

Frank K. Ziegler, 9 South Clinton Street, Chicago, has been appointed to handle the complete line of Upton electric salt bath furnaces in the Chicago area, Charles R. Pollock, sales manager, Upton Electric Furnace Co., 2211 Grand River Avenue, Detroit, announces.

R. D. Werner Co., Inc., New York, finishers of extruded metal moulding, have announced a new line of plastic products under the trade names "Plastikmould" and "Plastiktrim." These products are manufactured in shapes and sizes similar to aluminum.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extas, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ [10]			
TERNES, MFG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only. 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pitsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	68
9/16 and ⅝ in. by 6 in. and shorter	66
¾ to 1 in. by 6 in. and shorter	64
1⅛ in. and larger, all lengths	62
All diameters over 6 in. long	62
Lag, al sizes	65
Plow bolts	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	66
9/16 to 1 in. inclusive	63
1⅛ to 1½ in. inclusive	61
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
7/16 in. and smaller		68
½ in. and smaller	66	..
½ in. through 1 in.	..	64
9/16 to 1 in.	63	..
1⅛ in. through 1½ in.	61	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	71 and 10
Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pitsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pitsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws *Per Cent Off List*

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap screws, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	May 14	May 15	May 16	May 17	May 19	May 20
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York[2]	52.125	52.125	52.25	....	52.25	52.25
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.70	5.70	5.70	5.70	5.70	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	52.75	55.00
Copper		
Electro	13.00	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	Nom'al	Nom'al
Lead		
American pig	6.85	6.35
Bar	8.70	8.85
Cut sheets	9.00	91.0
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt, 98-99%	18.00	18.50
Solder		
½ and ½	32.00	32.75
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	10.625	11.25
Hvy. and wire	9.625	10.025
Light and bottoms	8.625	9.125
Brass		
Heavy	6.125	6.625
Light	5.125	5.875
No. 1 yel. turn	5.875	6.375
No. 1 red or compo. turnings	9.375	10.375
Hvy. Mach. compo.	9.625	9.850
Lead		
Heavy	5.00	5.50
Aluminum		
Cast	1100-12.00	
Sheet	12.00-13.50	
Zinc	5.10	

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $180-$182. per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade .....2.70c.
Delivered, Detroit .....2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.
Open hearth grade .....3.50c.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

20% Chromium-Nickel Clad Steel

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago..$54.80
6-in. and larger, del'd New York 52.20
6-in. and larger, Birmingham.. 46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle 56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37,35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over ..... Base
30,000 lb. or ft. to 39,999 lb. or ft. 5%
20,000 lb. or ft. to 29,999 lb. or ft. 10%
10,000 lb. or ft. to 19,999 lb. or ft. 20%
5,000 lb. or ft. to 9,999 lb. or ft. 30%
2,000 lb. or ft. to 4,999 lb. or ft. 45%
Under 2,000 lb. or ft..... 65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	33
¼ to ⅜ in.	59	40½
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+33
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Lap Weld

Steel		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
7 and 8 in.	65	52½
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
9 to 12 in.	28½	12

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	38½
¼ to ⅜ in.	56½	42½
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron		
¼ and ⅜ in.	+10	+46
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
7 and 8 in.	65½	53
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21
7 and 8 in.	38½	21½
9 to 12 in.	32	17½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Grosss Ton

Old range, bessemer, 51.50%..	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Per Unit

African, Indian, 44 to 48% Mn. 57c. to 61c.

African, Indian, 49 to 51% Mn. 60c. to 65c.

Brazilian, 46 to 48% Mn...54c. to 59c.

Cuban, del'd, duty free, 51% Mn. 67½c. to 71c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered....$23 to $24

Tungsten, domestic, scheelite, delivered $23.00

Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton; South African (low grade)..... Nom.

Rhodesian, 45% $25.00

Rhodesian, 48% ...$28.00 to $30.00

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

Base per Lb.

Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts, steam railroads	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*

Super-duty brick at St. Louis	$60.80
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri, and Illinois	42.75
Second quality, New Jersey	9.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick *Net per Ton*

Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	

Magnesite Brick

Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered Lump Size

50% (carload lots, bulk).....$74.50*
50% (ton lots, packed)..... 87.00*
75% (carload, lots, bulk)....135.00*
75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....$28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C. f.o.b. furnace carload and contract, per net ton.....$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C. f.o.b. furnace, carload and contract per net ton.....$157.50

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24% per gross ton, $3 unitage, freight equalized with Nashville 75.00

Ferromolybdenum, per lb. Mo., f.o.b. furnace ..... 95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.

Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.....4.90c.
No. 6, f.o.b. Bayonne, N. J.....3.21c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds., del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland..5.75c.
No. 4 indus., del'd Cleveland...5.375c.
No. 5 indus., del'd Cleveland...5.125c.
No. 6 indus., del'd Cleveland...4.875c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt ..... $6.00 to $6.25

Foundry, f.o.b. Connellsville, prompt ..... $6.75 to $7.00

F'dry, by-product, Chicago 10.50

F'dry, by-Product, New England 13.75

Foundry, by-product, Newark or Jersey City ..... $12.45 to 12.95

F'dry, by-product, Philadelphia . 12.13

F'dry, by-product, Cleveland ... 12.05

F'dry, by-product, Cincinnati ... 11.00

Foundry, Birmingham 8.50

F'dry, by-product, St. Louis $10.75 to $11.00

BRITISH

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export £29 16s. 3d.

Tin plate, per base box . 32s. to 33s.

Steel bars, open hearth . . £16 10s.

Beams, open hearth . . . . £19 10s.

Channels, open hearth . . . £19 10s.

Angles, open hearth . . . . £15 10s.

Black sheets, No. 24, gage £22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage £25 12s. 6d max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$25.50***	***$25.00***	***$26.50***	***$26.00***	
Brooklyn	***27.50***	.....	.....	***28.00***	
Jersey City	***26.53***	***26.03***	***27.53***	***27.03***	
Philadelphia	***25.84***	***25.34***	***26.84***	***26.34***	
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	
Everett, Mass.	25.00	24.50	26.00	25.50	
Swedeland, Pa.	25.00	24.50	26.00	25.50	
Steelton, Pa.	.....	24.50	.....	.....	29.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	
Neville Island, Pa.	24.00	23.50	24.50	24.00	
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	
Buffalo	24.00	23.00	25.00	24.50	29.50
Cincinnati	***24.44***	***24.61***	.....	***25.11***	
Canton, Ohio	***25.39***	***24.89***	***25.89***	***25.39***	
Mansfield, Ohio	***25.94***	***25.44***	***26.44***	***25.94***	
St. Louis	***24.50***	***24.02***	.....	.....	
Chicago	24.00	23.50	24.50	24.00	
Granite City, Ill	24.00	23.50	24.50	24.00	
Cleveland	24.00	23.50	24.50	24.00	
Hamilton, Ohio	24.00	23.50	.....	24.00	
Toledo	24.00	23.50	24.50	24.00	
Youngstown††	24.00	23.50	24.50	24.00	
Detroit	24.00	23.50	24.50	24.00	
St. Paul	***26.63***	.....	***27.13***	***26.63***	
Duluth	24.50	.....	25.00	24.50	
Birmingham	20.38	19.00	25.00	.....	
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	
Provo, Utah	22.00	.....	.....	.....	
Montreal†	27.50	27.50	.....	28.00	
Toronto†	25.50	25.50	.....	26.00	

GRAY FORGE

Valley or Pittsburgh fce. $23.50

CHARCOAL

Lake Superior fce. $28.00
Delivered Chicago 31.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

††Pittsburgh Coke & Iron and Struthers furnaces are quoting $24.50 a ton for No. 2 foundry, basic and malleable, and $25.00 a ton for bessemer iron at Sharpsville and Youngstown.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.12	4.35	4.23	6.50
Sheets, galvanized	4.75	4.60	4.62	5.00	5.00	4.84	4.75	5.11	4.75	4.24	4.75	4.98	5.25
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	4.99	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.52	3.46	....	3.61	3.83	3.54	....
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.15
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.15
Bars cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	9.55
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	10.55
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.55

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions; **Chicago, galvanized sheets,** 500 to 1499 lb.; **Philadelphia, galvanized** sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, **galvanized sheets,** 500 to 1499 lb.; **Buffalo,** cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; **Boston,** cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., **galvanized sheets,** 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 6 bundles. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43.

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PHILCO, Battery Division

Dept. 399 **Philadelphia, Pa.**

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

● **Chandler-Evans Corp.,** South Meriden, Conn., aircraft equipment and parts, has let general contract to Brown & Matthews, Inc., 122 East Forty-second Street, New York, for one-story addition, 110 x 210 ft., for increased production of aircraft fuel pumps and allied equipment for Government. Cost close to $125,000, with equipment.

Parks-Cramer Co., Inc., 970 Main Street, Fitchburg, Mass., air-conditioning and heating equipment, has purchased former local mill of Shirreffs Worsted Mill, Inc., for plant, removing present works to new location and expanding capacity.

Perkins Machine & Gear Co., Circuit Avenue, Springfield, Mass., gears, speed reducers, etc., has let general contract to Ernest F. Carlson, Inc., 1694 Main Street, for one-story addition, 35 x 220 ft. Cost over $100,000 with equipment.

Chapman Valve Mfg. Co., Indian Orchard, Mass., has let general contract to Stone & Webster Engineering Corp., 49 Federal Street, Boston, for one-story addition for expansion in foundry. Cost close to $50,000 with equipment.

General Electric Co., Lynn Works, Lynn, Mass., will carry out expansion and improvements in plant buildings for production of airplane engine parts for Government. Fund of $752,532 will be secured through Defense Plant Corp., Washington, for project, majority of appropriation to be used for purchase of machinery and equipment. Company is building plant at Everett, Mass., for production of aircraft equipment for Government, to cost about $6,000,000 with machinery, and for which appropriation in such amount has been secured through same agency.

Clover Mfg. Co., 372 Main Street, Norwalk, Conn., abrasive products, has let general contract to Hewlett Construction Co., 1385 Iranistan Avenue, Bridgeport, Conn., for two-story addition, 60 x 160 ft. Cost close to $70,000 with equipment.

Robins Dry Dock & Repair Co., Erie Basin, Brooklyn, has let general contract to Irons & Reynolds, Inc., 420 Lexington Avenue, New York, for one-story forge shop addition, 100 x 150 ft. Cost about $75,000 with equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Underwood-Elliott-Fisher Co., 1 Park Avenue, New York, typewriters, accounting machines, parts, etc., has purchased an industrial building near present plant on Capitol Avenue, Hartford, Conn., for reported consideration of close to $200,000, and will improve for expansion.

Sherron Metallic Corp., 1201 Flushing Avenue, Brooklyn, metal telephone booths and other metal structures, has asked bids on general contract for one-story addition. Cost close to $65,000 with equipment. Kolb & Miller, 31 Union Square, New York, are architects and engineers.

Celanese Corp. of America, Inc., 180 Madison Avenue, New York, rayon products, is acquiring about 148 acres on Laurel Hill Road, near Verona, Va., for new mill, with power house, machine shop and auxiliary structures. Cost over $1,000,000 with machinery.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for drydock pumping equipment for Brooklyn Navy Yard, including removal and replacement of main dock pumping units, motor starters, control cabinets, switchgear, motor-operated valves with controls, new controls for existing pump motors, pump suction and discharge piping, etc. (Specification 10,106).

Electro Metallurgical Co., Union Street, Niagara Falls, N. Y., is erecting an addition, for which general contract recently was let to Scrufari Construction Co., 825 Fifteenth Street, for expansion in furnace department. Cost close to $85,000 with equipment.

New York State Electric & Gas Corp., Ithaca, N. Y., plans addition to steam-electric generating station at Penn Yan, N. Y. Cost over $650,000 with equipment.

Lake Erie Engineering Corp., Riverview and Woodward Avenues, Kenmore, Buffalo, hydraulic presses, special machinery and parts, plans one-story addition. Cost close to $50,000 with equipment.

Cooper Alloy Foundry Co., 154 Broadway, Elizabeth, N. J., special castings, stainless steel products, has filed plans for one-story addition to branch plant at Hillside, N. J., formerly works of H. Breen Iron Works, for expansion. New unit will be used for pattern department in conjunction with one-story foundry, now in course of erection. Entire project will cost close to $50,000 with equipment.

Air Associates, Inc., Bendix Airport, Bendix, N. J., aircraft equipment, has let general contract to Brown & Matthews, Inc., 122 East Forty-second Street, New York, for one-story addition. Cost over $250,000 with equipment. This is part of plant expansion for Government orders.

Schweitzer Paper Co., a subsidiary of Peter J.Schweitzer, Inc., 994 Newark Avenue, Elizabeth, N. J., cigarette papers, carbon and other processed paper stocks, has leased two-story and basement building at McCarter Highway and Miller Street, Newark, N. J., about 23,600 sq. ft. of floor space, for new plant.

Newark Brass Foundry, 320 Schuyler Avenue, Kearny, N. J., brass, bronze and other metal castings, plans one-story addition, 50 x 100 ft. Cost close to $50,000 with equipment.

Kind & Knox Gelatin Co., Fifth Street, Camden, N. J., food products, will begin superstructure soon for one-story addition, 150 x 195 ft., for which general contract recently was let to L. A. Houser Co., Inquirer Building, Philadelphia. Cost over $125,000 with equipment. G. L. Neutze, 820 North Third Street, Camden, is architect.

Pittsburgh Plate Glass Co., Paint and Oil Division, 4 Chester Avenue, Newark, N. J., plans one-story addition. Cost over $75,000 with equipment. John H. and Wilson C. Ely, 744 Broad Street, are architects. Main offices are in Grant Building, Pittsburgh.

Penn Galvanizing Co., 2201 East Tioga Street, Philadelphia, galvanized shapes, chains, bolts, etc., has approved plans for one-story addition, 60 x 240 ft. Cost over $85,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for condenser, air ejector and condensate pumps for Philadelphia Navy Yard (Specifications 10401).

C. K. Williams & Co., Inc., North Thirteenth Street, Easton, Pa., mineral colors, chemicals, etc., has let general contract to Collins & Maxwell, Inc., Easton Trust Building, for new steam power house. Cost over $150,000 with equipment. Lockwood Greene Engineers, Inc., 10 Rockefeller Plaza, New York, is consulting engineer.

Erie Forge Co., Fifteenth and Cascade Streets, Erie, Pa., steel forgings and castings, grinding rolls, etc., has plans for expansion for production for Government, including one or more one-story buildings to cost about $250,000 exclusive of equipment. Machinery and other equipment will cost about $882,000. Appropriation for entire project has been secured from Government.

Lee C. Moore & Co., Inc., Neville Island, Pittsburgh, derricks and other heavy equipment, has leased former plant of Union Drawn Steel Co., Fifteenth Street, about 60,000 sq. ft. floor space, for branch works for steel fabrication. Harold E. Littell is chief engineer in charge.

United States Engineer Office, Baltimore, asks bids (no closing date stated) for hangar, 120 x 160 ft., for Air Corps, and boiler house, 25 x 30 ft., at Harrisburg municipal airport, Fairview Township, York County, Pa.

Baltimore Steel Drum Co., Inc., 1537 Ridgely Street, Baltimore, plans one-story addition for storage and distribution. Cost close to $45,000 with equipment.

Chief, Division of Purchase and Supply, National Archives, Washington, asks bids until May 26 for one portable steel-strapping machine, with automatic seal feed and seals (Circular 510).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 27 for oxygen transfer equipment (Schedule 6799), portable air compressors (Schedule 6768), electric cable (Schedule 6814), motor-driven bench lathes (Schedule 6825), tractor trucks (Schedule 6803), motor-driven bending roll (Schedule 6834), goggles, frames and masks (Schedule 6795), motor-driven milling machine (Schedule 6831); until May 29 for electric furnaces (Schedule 6830), steel rivets and washers (Schedule 6810), motor-driven portable air compressors (Schedule 6826) for Eastern and Western yards.

The South

● **Sylva Paperboard Co.,** Sylva, N. C., plans expansion and improvements to digester building, pulp mill and paper-making divisions to advance capacity about 50 per cent. Cost close to $250,000 with machinery.

Zagora Machine & Gear Co., Charlotte, N. C., equipment for textile and other industries, has let general contract to Carl Oates Co., Charlotte, for one-story addition, 55 x 110 ft. Cost close to $50,000 with equipment.

Public Works Officer, Navy Yard, Charleston, S. C., asks bids until May 27 for two 55,000-bbl. fuel oil storage tanks, oil heaters, oil-fired boiler, pump houses and pumping machinery, underground cast iron pipe lines, steam and condensate piping for local navy yard (Specification 10365); until May 28 for boiler house and other buildings at Inshore Patrol Base, Charleston (Specification 10409).

United States Engineer Office, Huntington, W. Va., will take bids at once for Pats branch pumping station for Guyandotte flood wall, Huntington flood wall system, for which bids will be asked at same time, including motor-driven pumping machinery and accessories, control equipment, etc. Entire project will cost about $2,265,000.

Tampa Shipbuilding Co., Tampa, Fla., has secured an additional loan of about $2,000,000 through RFC for expansion for construction of vessels for Navy Department, including new shipways, shops and other structures. Company recently acquired large waterfront site.

Steel Heddle Mfg. Co., Greenville, S. C., parts for textile machinery, shuttle blocks, etc., plans new one-story plant on Highway No. 29, near city, where about 11 acres recently was acquired for expansion. One-story storage and distributing building will be erected later. Cost over $50,000 with equipment.

Shell Oil Co., Inc., Shell Building, Houston, Tex., has let contract to C. F. Braun & Co., Inc., Alhambra, Cal., for addition to local Deer Park oil refinery for production of toluene, an ingredient of TNT, secured from petroleum gases. This will duplicate similar expansion at refinery, recently completed. Cost about $500,000 with machinery.

Farmers' Electric Generating Co-operative, Inc., Gilmer, Tex., plans new steam-electric power plant for rural electric lines in Panola, Rocksall and other counties. Cost over $1,300,000. Initial appropriation of $250,000 has been secured through Federal aid. Freese & Nichols, Inc., Capps Building, Fort Worth, Tex., is consulting engineer.

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Self-contained. Ready for operation when connected to power and water. 3'x4'—waist high. Provides 20 KW—9600 cycles—for extremely accurate surface-hardening of small parts. One-station unit with rotatable transformer panel, work pan, pre-set, full automatic controls, quench and cooling water valves and other proved TOCCO features. Easy to operate. Get full details on the new TOCCO Model 20 ST MG 10.

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Central States

● **Lamson & Sessions Co.**, Kent, Ohio, bolts, nuts, screws, etc., will take bids soon on general contract for one-story addition. Cost close to $60,000 with equipment.

Southern States Co-operative Mills, Inc., 2101 East Fort Avenue, Baltimore, has let general contract to Ferro Concrete Construction Co., Third and Elm Streets, Cincinnati, for new grain and feed-mixing plant near Reading Road, Cincinnati. Cost about $250,000 with machinery. A. E. Baxter Engineering Co., 344 Delaware Avenue, Buffalo, is consulting engineer.

Federal Foundry Supply Co., 4600 East Seventy-first Street, Cleveland, foundry facings, core ovens, and other foundry equipment, has let general contract to Alger-Rau, Inc., 12434 Cedar Road, for two-story addition, 60 x 140 ft., for expansion in machine shop, and two-story office building, 38 x 66 ft. Cost over $90,000 with equipment. Harlen E. Shimmin, Rogers Building, is architect.

Harrison Tool & Mfg. Co., Elyria, Ohio, recently organized with capital of $100,000 by Harry L. Harrison, 1630 Lewis Drive, Lakewood, Ohio, and associates, will take over plant and business of Whidden Mfg. Co., Elyria, tools and appliances. Expansion is planned for production of extensive line of small tools.

Delco Products Division, General Motors Corp., East First Street, Dayton, Ohio, motors, starters, etc., has secured fund of $5,482,500 through Defense Plant Corp., Washington, for purchase of machinery and equipment for plant buildings now under way, for production of struts and other parts for airplanes for War Department.

Valley Mould & Iron Corp., Hubbard, Ohio, plans rebuilding part of pattern shop recently destroyed by fire. Loss about $50,000 with equipment.

Production Plating Works, Inc., Lebanon, Ohio, metal plated products, has let general contract to F. K. Vaughn Building Co., First National Bank Building, Hamilton, Ohio, for one-story plant. Cost close to $50,000 with equipment. Carl J. Kiefer & Associates, Inc., Schmidt Building, Cincinnati, is architect and engineer.

Board of Trustees, Ball State Teachers' College, Muncie, Ind., asks bids until May 27 for extensions and improvements in power plant, including boilers, stokers, coal and ash-handling equipment, combustion control apparatus, etc. Bevington-Williams, Inc., Indiana Pythian Building, Indianapolis, is consulting engineer.

Durham Mfg. Co., Mound and Cleveland Streets, Muncie, Ind., domestic metal products, has begun work on one-story addition, for which general contract recently was let to A. J. Glazer, 401 South Lincoln Street. Cost close to $50,000 with equipment.

United States Engineer Office, Federal Building, Louisville, asks bids until June 5 for five pumping plants at Evansville, Ind.

Santa Fe Railway Co., Wichita, Kan., has let general contract to George Senne & Co., 510 East Fifteenth Street, Topeka, Kan., for one-story car repair shop at general repair and maintenance works at Wichita. Cost about $50,000 with equipment.

General Motors Parts Division, 3809 North Union Boulevard, St. Louis, has approved plans for one-story addition, 25 x 741 ft., for expansion in assembling department. Cost over $300,000 with equipment.

Pepsi-Cola Bottlers, Inc., 645 Tower Grove Avenue, St. Louis, has let general contract to William H. & Nelson Cunliff Co., 3320 Lindell Boulevard, for two-story addition, 75 x 145 ft., for expansion in mechanical-bottling department. Cost over $85,000 with equipment.

McDonnell Aircraft Corp., Lambert-St. Louis Municipal Airport, St. Louis, has secured fund of $512,700 through Defense Plant Corp., Washington, for new plant at Robertson, Mo., for production of aircraft parts for War Department.

Black, Sivalls & Bryson, Inc., 7500 East Tenth Street, Kansas City, Mo., and Westwood Street, Oklahoma City, pressure vessels, foundry flasks and other equipment, plans one-story branch plant at Alice, Tex., comprising machine shop and welding works. Cost close to $75,000 with equipment. K. B. Banks, Oklahoma City offices, is engineer.

Bohn Aluminum & Brass Corp., Lafayette Building, Detroit, bronze, brass and aluminum forgings and castings, has let general contract to Krieghoff Co., 6661 French Road, for one-story addition. Cost about $125,000 with equipment.

Dearborn Stamping Co., Dearborn, Mich., stamped metal products, has let general contract to Talbot & Meier, Inc., 1000 Larchwood Street, Detroit, for one-story addition for tool and die shop expansion. Cost about $60,000 with equipment. H. H. Esselstyn, Majestic Building, Detroit, is architect.

Chevrolet Motor Division, General Motors Corp., Saginaw, Mich., plans one-story addition, 30 x 125 ft., for expansion in gear and transmission department. Cost over $80,000 with equipment.

Ideal Furnace Co., Milan, Mich., furnaces, stoves and parts, has engaged Giffels & Vallet, Inc., Marquette Building, Detroit, to prepare plans for one-story plant to replace works destroyed by fire several months ago. Cost about $125,000 with equipment.

Stinson Aircraft Division, Vultee Aircraft, Inc., Wayne, Mich., airplanes and parts, plans one-story addition for expansion in parts production and assembling departments; also will build new power house and administration building. Cost over $100,000 with equipment. Gordon B. Kaufmann, 627 South Sarondelet Street, Los Angeles, is architect. Main offices of parent company are at Vultee Field, Downey, near Los Angeles.

Atlas Forgings Co., 1443 South Fifty-fifty Court, Cicero, Chicago, has let general contract to Argot B. Larson & Co., 3837 West Lake Street, Chicago, for one-story addition, 45 x 70 ft., for extensions in machine shop. Cost close to $50,000 with equipment.

International Harvester Co., 180 North Michigan Avenue, Chicago, will convert buildings at factory branch, St. Paul, Minn., now used for warehouse, for plant for production of guns for War Department. Equipment and facilities will be installed for employment of about 1500 workers. Fund of $4,000,000 will be secured from Government for project, practically entire amount to be used for purchase of tools and machinery.

Lake Superior Shipbuilding Co., Cuming Slip and North First Street, Superior, Wis., plans one-story addition, 70 x 200 ft., for ship fitting shop, installation to include furnace unit and accessories; also will make improvements in yard. Cost over $65,000 with equipment. John O. Bach, 1017 Tower Avenue, is architect.

Thilmany Pulp & Paper Co., Kaukauma, Wis., glassine, greaseproof and other processed paper stocks, has let general contract to Permanent Construction Co., 2712 North Holton Street, Milwaukee, for one-story addition, 50 x 182 ft. Cost close to $90,000 with machinery.

Iowa Electric Light & Power Co., Cedar Rapids, Iowa, plans expansion and improvements in steam-electric power plant at Boone, Iowa, primarily for steam division, to include new high-pressure boiler and auxiliary equipment. Cost over $650,000 with equipment. This is part of general expansion program to cost about $4,000,000, for which bond issue is being arranged.

Plankinton Packing Co., 230 South Muskegon Avenue, Milwaukee, meat packer, has let general contract to Kroening Engineering Corp., 4500 West Mitchell Street, for one-story addition. Cost close to $125,000 with equipment.

Mills Novelty Co., 4110 West Fullerton Avenue, Chicago, coin-operated vending machines and parts, has let general contract to B. W. Construction Co., 307 North Michigan Avenue, for new one-story plant at Lake Street and Kilpatrick Avenue, 400 x 400 ft. Cost over $450,000 with equipment. Victor L. Charn, 141 West Jackson Boulevard, is architect.

McInnes Flying Service, Wold-Chamberlain Field, Minneapolis, plans addition to steel hangar to more than double present capacity, with extensions in repair and maintenance shop. Cost close to $50,000 with equipment. Lang & Raugland, Wesley Temple Building, are architects.

Western States

● **Seattle-Tacoma Shipbuilding Corp.**, Harbor Island, Seattle, plans further extensions in shipyard, where expansion is now under way, including new outfitting pier, 65 x 1200 ft.; one-story structural and mechanical shop, 150 x 450 ft.; equipment storage and distributing building, 150 x 300 ft. Cost over $650,000 with equipment.

Val Vita Packing Co., Fullerton, Cal., food products, has leased three one-story buildings to be erected on local site by Las Vegas Land & Water Co., 422 West Sixth Street, Los Angeles, for new fruit processing and canning plant, one structure for storage and distribution. Plant will total about 140,000 sq. ft. floor space. Cost close to $200,000 with equipment. Bids have been asked for erection. Douglas McLellan, Architects' Building, Los Angeles, is architect.

Bureau of Reclamation, Denver, asks bids until May 26 for three 57-in. motor-operated butterfly valves for spillway section, Friant Dam, Central Valley Project, Cal. (Specifications 1511-D).

Lehigh Portland Cement Co., Old National Bank Building, Spokane, Wash., has let general contract to S. G. Morin, 309 Bernard Street, for new two-story bulk storage and distributing building, 30 x 400 ft. Cost close to $100,000 with mechanical-handling and other equipment. Main offices are at Allentown, Pa.

Public Works Officer, Puget Sound Navy Yard, Bremerton, Wash., asks bids (no closing date stated) for two 1000-kw. and one 800-kw. motor-generator sets, with switchboards and one 100-kw. dual drive, steam-electric exciter (Specifications 10425).

Astoria Marine Construction Co., Astoria, Ore., plans expansion at shipyard for construction of mine sweepers for Navy Department, including new shops and shipway extensions. Cost about $250,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 27 for one combination contour metal-sawing, filing and polishing machine, motor-driven, for Seattle (Schedule 6797); 288 single arc welding panels for Puget Sound yard, Bremerton, Wash. (Schedule 6788).

Canada

● **RCA-Victor Co., Ltd.**, 976 Lacasse Street, Montreal, radio equipment, talking machines, etc., has let general contract to J. L. E. Price & Co., Ltd., 680 Sherbrooke Street West, for two-story and basement addition, 60 x 225 ft. Cost close to $100,000 with equipment. W. K. G. Lyman, 2058 Victoria Street, is architect.

Department of National Defense for Air, Government of Canada, Ottawa, has let general contract to New Brunswick Contractors, Ltd., and Diamond Construction Co., Ltd., Royal Bank Building, Fredericton, N. B., for new hangars, repair and reconditioning shops, oil and gasoline storage and distribution facilities at airport at Scoudouc, N. B. Cost close to $500,000 with equipment.

United Steel & Metal Co., Ltd., 395 Wellington Street North, Hamilton, Ont., will begin superstructure at once for one-story addition, 60 x 200 ft. Cost close to $125,000 with equipment.

Abrasive Co. of Canada, Ltd., Arvida, Que., has plans for new factory to cost $40,000. Lamontagne & Gravel, Racine Street, Chicoutimi, Que., are architects.

Vivian Engine Works, Ltd., 1090 W. 6, Vancouver, B. C., will start work immediately on plant addition, to cost $75,000 with equipment. E. E. Brethous is general contractor.

Union Pipe & Machinery, Ltd., 900 Wellington Street, Montreal, has awarded general contract to McGill Construction Co., 5340 Esplanade Avenue, for a machine shop at 1671 Colborne Street, to cost about $50,000 with equipment.

British Columbia Electric Railway Co., 425 Carrall Street, Vancouver, B. C., is proceeding with $750,000 power development project, for which turbines have been awarded to Parsons Co., England; boilers will be obtained from makers in eastern Canada.

This Week in The Iron Age

MAY 29, 1941

VOL. 147, NO. 22

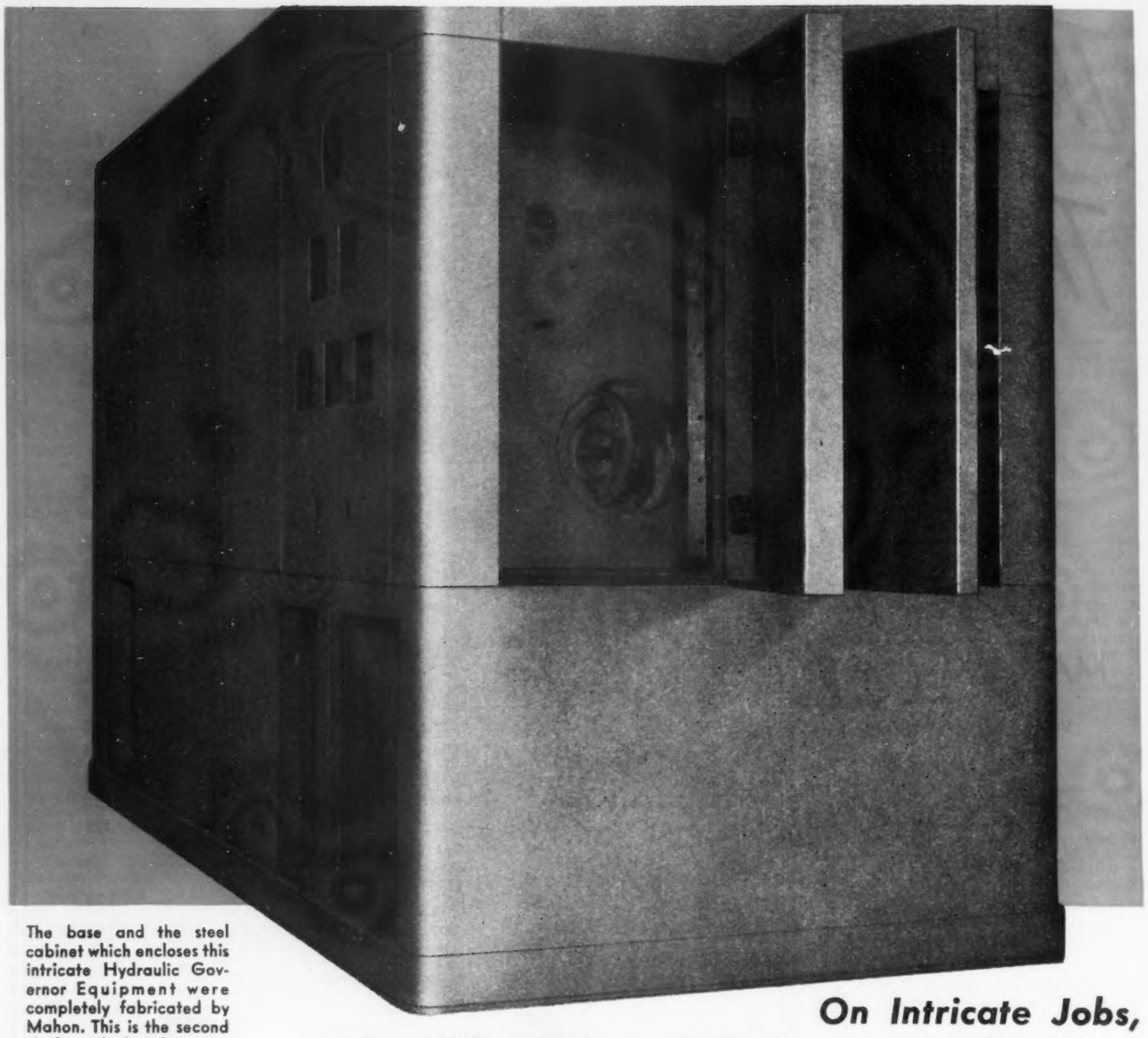
Member, Audit Bureau of Circulations
Member, Associated Business Papers
Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year. Single copy, 25 cents.
Cable Address, "Ironage, N. Y."

Owned and Published by
CHILTON COMPANY
(Incorporated)

Publication Office
Chestnut and 56th Sts., Philadelphia, Pa.
U. S. A.

Editorial and Executive Offices
100 East 42nd St.
New York, N. Y.
U. S. A.

Welded STEEL PLATE *Fabrication*



The base and the steel cabinet which encloses this intricate Hydraulic Governor Equipment were completely fabricated by Mahon. This is the second similar job for the same company. Three more are now on order.

On Intricate Jobs, Like This, Mahon Skill Shows to Advantage

In the production of *Welded* Steel Plate Products, Mahon has nation-wide recognition for unexcelled workmanship. The Mahon organization of skilled metal workers is backed by the most modern welding and handling equipment. Manufacturers will find these superior Mahon facilities of inestimable value in the working out of any problem involving welded steel plate fabrication—no matter how complicated the job may be. Send blueprints for quotations.

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The Iron Age

MAY 29, 1941

ESTABLISHED 1855

Looking Ahead

HOW far are you looking ahead?

How far one has to look ahead depends on what he is doing.

If he is playing golf, he keeps his eye on the ball, at his feet.

If he is driving a car, he keeps his eye on the road, a hundred yards ahead.

If he is navigating a ship, he looks ahead a mile or two to see what lies before him.

How far one looks ahead, in the matter of time, depends upon his occupation and his position. It varies considerably, even in a given industry.

The machine operator in an industrial plant looks to today's production. The production superintendent looks to next week's manufacturing schedule. The plant manager looks to next month's requirements in terms of floor space and manpower-hours. The tool engineer looks six months ahead to the tools and dies for next season's model. The product designer looks a year ahead to the succeeding model. The top sales executives look perhaps two years ahead to discern changes in buying habits and consumer trends.

Sometimes it is necessary to look forward more than at other times. There have been epochs in which the world has stood still—we call them, in our ignorance, periods of normalcy—in which hindsight could substitute for foresight. There have been times when our grandfathers had to look backward more than forward to keep the Indians from creeping up and scalping them.

But not so today. This is not a period of so called "normalcy"; the world is turning over at high speed and our dangers as well as our opportunities are approaching us from the front, not from the rear.

Today we have this choice: We can look backwards and learn history, or we can look forward and make it.

Inland Watches the "Little Things" That Help Make Quality Steel

An important reason why true value is in each pound of Inland Steel is the close attention to every detail of Inland steelmaking. Proof of watchfulness over "little things" is found throughout the Inland plants, and in all service departments.

Take for example, tests at the Inland open hearth furnaces. Repeated tests are made of the molten bath and slag from each furnace to determine the progress of the refining action of each heat. Analyses are made for carbon, manganese, phosphorus and sulphur in the steel, and ferrous oxide in the slag. Each analysis is accurately determined within 30 minutes from the time a sample is taken. Not a single detail of furnace operation and product control is omitted in refining Inland Quality Steel.

There are scores of other examples of Inland attention to details—from careful selection of raw materials to proper loading the finished product for safe transit and fast unloading.

The Inland custom of doing "big things" well, and giving close attention to "little things" is your assurance of high quality steel and cooperative service.

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Desulphurization With Alkali

—Is this type of external desulphurization of hot metal practical in American blast furnace practice? What is the effect of such desulphurized iron upon open hearth practice and quality? These are the questions answered at least in part by the first full dress research in this country

o o o

By RALPH H. SWEETSER
Blast Furnace Consultant, New York

o o o

IF the answer to the question of whether external desulphurization of hot metal with alkali is practical in American blast furnace practice had been available to the blast furnace operators of this country during the First World War, there would have been no need for a solemn gathering of about 120 blast furnace managers on Sept. 23, 1918, in the office of Steel Director J. Leonard Replogle. With 371 blast furnaces in blast, driven as hard as possible, the industry was still 4,000,000 tons below the rated annual production of 42,000,000 tons of pig iron. Steel Director Replogle summoned the managers to show cause why. Most of the answers were that high ash and high sulphur coke prevented normal production.

Within seven weeks from that September questioning day the war was over and the strain on pig iron production was past.

The use of soda ash and various alkali compounds has found its place in the blast furnace practice of England and Germany in many cases where the raw materials are greatly inferior to those in regular use in this country. The practice of external desulphurization of hot metal is generally recognized as essential under such circumstances, but up to about two years ago blast furnace operators in this country paid very little attention to it and were content to take advantage of the high grade coking coals and low sulphur iron ores available to them in abundance. Even at the Conference of the Blast Furnace and Raw Materials Committee of the American Institute of Mining and Metallurgical Engineers in Buffalo, April 20-23, 1938, the papers on the desulphurization of pig iron at the blast furnace and of cast iron in the foundry did not arouse much attention.

The question came up again about a year ago just at the time when the Research Committee of the Blast Furnace and Raw Materials Committee of A.I.M.E. was looking for a problem of research work in connection with hot metal that would be of benefit to the whole steel industry. At the April, 1939, meeting in Cleveland, Messrs. A. J. Boynton (chairman) and H. W. Johnson were appointed a committee of two to make recommendations as to how to proceed, the line of investigation to be taken, and how the research work should be financed. This Research Committee reported at the April, 1940, meeting in Pittsburgh that the Solvay Sales Corp. had suggested further investigation of the question of external desulphurization under the sponsorship of the Blast Furnace and Raw Materials Committee of A.I.M.E. Solvay wanted an unbiased, full-scale test at the steel plant of some cooperating company, and offered the services of the necessary engineers and observers, and the supply of soda ash required to make the test. The subcommittee recommended that they be authorized to find such a cooperating steel company, willing to have such an important test carried on at their blast furnaces, open hearth furnaces and rolling mills. This authorization was voted, probably with some doubts as to

whether such an extensive cooperative program, involving the equipment of an integrated steel plant and its operating personnel, would be agreeable to any steel company in these busy times.

The idea was heartily approved by the management of the Pittsburgh Steel Co., and it was decided that the test be made at their Monessen, Pa., plant, the works manager being R. C. Butler. Mr. Butler appointed Charles Labeka, plant metallurgist, to be in charge of the observations and the gathering of the data. The numerous details of the test were worked out by Messrs. Labeka and Maurice Wheldon (superintendent of blast furnaces) representing the Pittsburgh Steel Co., Harry J. Schwartz representing the Solvay Process Co. (the Solvay operating company furnishing the engineers and the several carloads of soda ash), and A. J. Boynton and Ralph H. Sweetser representing the Blast Furnace and Raw Materials Committee of A.I.M.E.

Research work, and especially industrial research, has certain definite aims in view, but often other answers are found in addition to those sought. In this particular research problem, both the steel makers and the alkali makers wanted to find out if it were economically and metallurgically practical to make high grade steel out of hot metal that had been desulphurized outside the blast furnace with soda ash instead of inside the blast furnace with limestone; also, how much more pig iron would a blast furnace make on "lean slag" practice than on the normal slag. It was hoped that a standard practice for the application of the soda ash might be developed.

Observations of "normal practice" were started late in September and continued until about Oct. 18, when the furnace was thrown over to "lean slag" practice by reducing the amount of limestone in the burden and deliberately making high sulphur pig iron; this part of the test was continued until Nov. 19, 1940. The sulphur in the hot metal was then greatly lowered by introducing soda ash into the stream of iron as it flowed from the furnace, or by placing soda ash in the ladles before casting, or by pouring the hot metal from the casting ladle into another ladle on the stand in the mixer building after throwing in a few bags of soda ash.

Observers took the temperature of every flush of cinder and every cast of iron throughout the period of "normal" practice and the period of "lean slag" practice. The record for each day when the furnace was on normal practice had about 190 items to be observed and recorded, including analyses of coke, slag, iron and top gas; temperatures of slag, iron, hot blast and top gas; pressures of blast and gas; and weights of ores, coke, limestone, flue dust and hot metal. The number of analyses and observations during "lean slag" practice was greatly increased because of the analyses before and after treatment with soda ash, and because of remarks as to how the soda ash was applied and as to the behavior of the desulphurized metal in the open hearth furnaces and the rolling mill.

Obviously such a program required much preliminary planning, watchful supervision in operating, careful sampling and analyzing during and after the test, and painstaking work in collecting and correlating the data.

These thousands of analyses and observations were collected, compiled and condensed into three papers which were presented at the annual conference of the Open Hearth Steel and Blast Furnace and Raw Materials Committees of A.I.M.E., at the Palmer House, Chicago, April 23-24, 1941. Maurice Wheldon, superintendent of blast furnaces, Monessen Works of the Pittsburgh Steel Co., read the paper, "Operation of a Blast Furnace for the Production of High Sulphur Iron," written by him and Glen Hanna, assistant superintendent of blast furnaces; and Charles L. Labeka, plant metallurgist at Monessen Works, read Part I, "The Desulphurization of Molten Iron with Soda Ash," written by him and John E. Walker, metallurgist, Monessen Works, at the Wednesday afternoon session of the Blast Furnace and Raw Materials Committee. Part II of the paper by Messrs. Labeka and Walker, entitled, "The Effect of Desulphurized Hot Metal on Open Hearth Practice and Steel Quality," and a summary of Part I were read by Mr. Labeka at the joint session—Open Hearth Steel and Blast Furnace and Raw Materials Committees — on Thursday morning. Many slides of the graphs, photographs and tables were shown.

Even while these tests were being carried on at Monessen Works it was realized that the results would have a direct bearing upon National Defense problems of the steel industry in this Second World War, and the three papers fitted

TABLE VII

Monthly Open Hearth Statistics Compared With the Desulphurizing Test Period

	September, 1940	Test Period, Oct. 18 to Nov. 19, 1940	December, 1940	January, 1941	February, 1941
Tons per hr., tap to tap	13.51	12.24	12.43	12.41	13.31
Bad bottom delays, minutes (average time per heat)	1.70	4.10	4.80	2.20	5.92
Percentage limestone to total mix	8.29	8.33	8.43	8.85	8.66
Percentage burnt lime to total mix	0.78	0.73	0.11	0.64	0.73
Percentage total lime to total mix	9.07	9.06	8.54	9.49	9.39
Percentage hot metal in mix	54.21	48.29	46.67	47.80	47.52
Average percentage of silicon in hot metal	0.85	0.88	0.86	1.00	0.88
Average percentage of sulphur in hot metal	0.037	0.031*	0.038	0.040	0.036
Percentage scrap in mix	42.78	48.77	50.32	47.64	48.54
Percentage cold iron in mix	3.01	2.94	3.01	4.56	3.94
Average number of furnaces operated	7.21	9.00	9.77	8.68	8.95
Average number of heats on roof beginning of month	91.50	101.22	92.90	94.70	59.22

* Sulphur content after soda ash treatment.

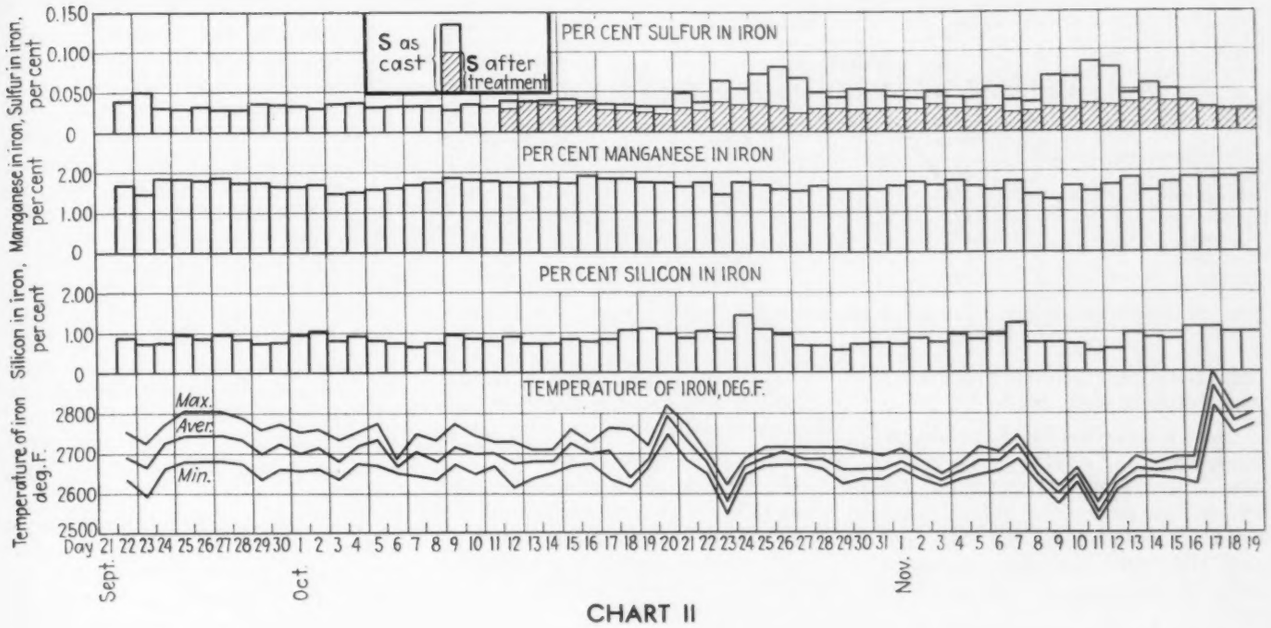


CHART II

nicely into the "theme" of the Chicago conference: "What the Raw Materials, the Open Hearth, and the Blast Furnace Man in the Steel Industry can do for National Defense."

The results, as presented by Mr. Wheldon, proved that high sulphur cokes can be used for blast furnace fuel without the necessity of carrying excessive slag volumes or strongly basic slags, because the extra sulphur in the pig iron can be easily and cheaply removed by using soda ash in the runners inside the casting house, or in the hot metal ladles. There is now no need of sending high sulphur hot metal to the open hearth furnaces, or of remelting cold pig iron because the sulphur is above the commercial limits. Such conditions will greatly broaden the sources of supply for coking coals and iron ores.

Chart II of the Wheldon-Hanna paper and Fig. 8 of the Labeka-Walker paper (both reproduced herein) show conclusively that when a blast furnace is deliberately run so as to make high sulphur pig iron, the soda ash treatment will prevent any high sulphur hot metal from going to the open hearth furnaces.

Unfortunately the No. 1 blast furnace did not have clean walls when this desulphurization test was started, but was "built up" inside on account of irregular demand for hot metal in previous months, the furnace having been in blast since October, 1937. Consequently, when the furnace burden was changed to "lean" slag the considerable reduction in limestone and increased ore burden in the charge did not give the expected increase in tonnage but gave the furnace such a cleaning out inside that it began to "roll" and slip, throwing out such great quantities of flue dust that it was several days before the furnace could be controlled, and the sulphur in the pig iron could be increased as planned. The daily average of the sulphur contents of each of the five casts of pig iron each day is shown on Chart II; the shaded portions show the percentage of sulphur after the soda ash treatment. There were individual casts during this period containing over 0.100 per cent sulphur, but the soda reduced it to the normal amount. Table VII (shown herein) shows that the average sulphur of hot metal after treatment was only 0.031 per cent throughout the test period, compared to an average of 0.037 per cent in the month of September under "normal" practice.

The introduction to the Labeka-Walker papers reads as follows:

"It has been generally known for many years that the addition of alkalis to high sulphur molten pig iron results in an iron with much lower sulphur content. Most of the literature covers desulphurization while it neglects the effect of the treated iron on subsequent steel operations.

"This paper is divided into two parts: First, the desulphurizing treatment of the iron, and second, the effect of treated metal on open hearth practice and steel quality. During the entire period of the test, about 9000 chemical deter-

TABLE I

Summary and Comparison of Methods for Adding Soda Ash

	Number of Tests in Sulphur Range 0.020-0.070	Average Pounds of Soda Ash per Ton of Iron	Average Sulphur Before	Average Sulphur After	Average Per Cent Reduction of Sulphur	Average Chemical Efficiency
A	282	8.2	0.0452	0.0279	38.1	13.93
B	85	7.3	0.0389	0.0272	30.	10.56
C	36	8.6	0.0487	0.0330	32.4	12.12
D	403	8.1	0.0440	0.0290	35.8	13.05

A = Regulated feed in runner at cast house.
B = Addition to bottom of ladles.
C = Reladled at mixer from a height of 25 ft.
D = Total of all tests for sulphur range 0.020 to 0.070 per cent.

TABLE III

Average Effect of Soda Ash Treatment on Elements in Iron

	Before	After	Number of Tests
Sulphur	0.0501	0.0287	497
Manganese	1.667	1.641	597
Silicon	0.873	0.816	587
Carbon	4.600	4.600	25
Graphitic	3.610	3.560	25
Combines	0.980	1.040	25

minations and 18,000 temperature observations were made."

Part I describes the methods and equipment for adding soda ash to the molten iron. "Throughout the entire test period the Solvay Process Co.'s dense soda ash was used, and the additions were made by each of the three following methods:

(1) Regulated feed into runner.

(2) Placing soda ash into ladle before casting.

(3) Reladle treatment at the mixer.

Table I shows the effect when the soda ash is added by different methods."

The average effect of soda ash treatment on the various elements in the hot metal were found to be as recorded in Table III of the paper.

The effect on the elements other than sulphur is small and from a practical viewpoint appears negligible. In analyzing the results of changes encountered in total graphitic and combined carbon, it should be pointed out that since the temperature of the iron, the analysis of the iron and the cooling rate all have an effect on the graphitization; the results obtained may not be entirely reliable.

Conclusions

The conclusions reached in Part I were that:

(1) The higher the original sulphur, the greater the per cent reduction when the desulphurization practice is identical.

(2) The method of adding the soda ash must be one that gives the most intimate contact between the iron and soda ash for a sufficient length of time to complete the reaction.

(3) The effect of soda ash on the other elements in the iron, although noticeable, is not of sufficient importance to be considered when treating the iron.

(4) The evolution of fumes from the reaction and its attendant physical effect on human skin must be considered. Unless an adequate system for the removal of fumes is included in an industrial application, the process will not prove feasible if carried out on a production basis.

It should be remembered that the data and conclusions presented in this paper were based upon the practice of manufacturing basic open-hearth iron which, during the period of the test, conformed to the following chemical analysis: Carbon, 4.00 to 5.00; sulphur, 0.03 to 0.100; manganese, 1.50 to 2.00; silicon, 0.60 to 1.00; phosphorus, 0.20 to 0.25.

Effect on Open Hearth

In the integrated steel plant, the ultimate consumer of iron from the blast furnace is the open-hearth department. Any attempt to make pig iron at a more economical figure must be reconciled with open-hearth demands. The production of cheaper iron in the blast furnace may result in no ultimate saving if the product increases cost of production in the open hearth. However, if the treated iron proves to be equal or better in quality than iron which results from normal blast furnace practice and the open hearth costs are not increased, then the practice of desulphurizing may be justified. In order to determine the effect of treated pig iron upon open hearth operations and steel quality, the following study was made:

All of the open hearth heats were made in 150-ton furnaces using producer gas as fuel. The sulphur in the coal averaged 1 per cent. In this series, 45 heats were made using treated hot metal which had an average analysis of 0.748 silicon, 1.64 manganese, 0.20 phosphorus and 0.0288 sulphur after treatment. The average temperature of the hot metal, when charged into the furnaces was 2325 deg. F.

This temperature in most cases, compared favorably to untreated iron normally charged into the furnaces, since in many cases as soon as the treated ladles reached the mixer they were taken directly to the furnaces, whereas the normal practice is to charge into the mixer and then into the furnaces.

In all cases the soda slag was skimmed thoroughly before charging into the open hearth furnaces.

These heats were compared to 45 other heats that were made using untreated iron. Although it is difficult to make comparisons since so many variables are encountered when making a heat of steel, only heats which compared favorably as to type of charge and grade of steel were used in this second group. See Table V (shown herein).

In addition to studying the ef-

TABLE V

Comparison of Two Groups of Heats; One Group Using Desulphurized Hot Metal, the other, Untreated Hot Metal

	Sulphur Before Treatment	Sulphur After Treatment	Ladle Sulphur in Steel	Per Cent Hot Metal	Per Cent Silicon in Hot Metal	Per Cent Scrap	Per Cent Ore	Per Cent Cold Iron	Per Cent Lime-Stone	Per Cent Burnt Lime	Time, Charge to Tap	Tons per Hour	Number of Heats
Treated hot metal....	0.0545	0.0288	0.0287	40.2	0.748	54.0	3.72	3.96	8.29	0.52	11.29	12.26	45
Untreated hot metal..	0.0353	.....	0.0297	40.3	0.868	54.3	3.38	3.45	8.40	0.66	11.21	12.35	45

All the values given are average figures.

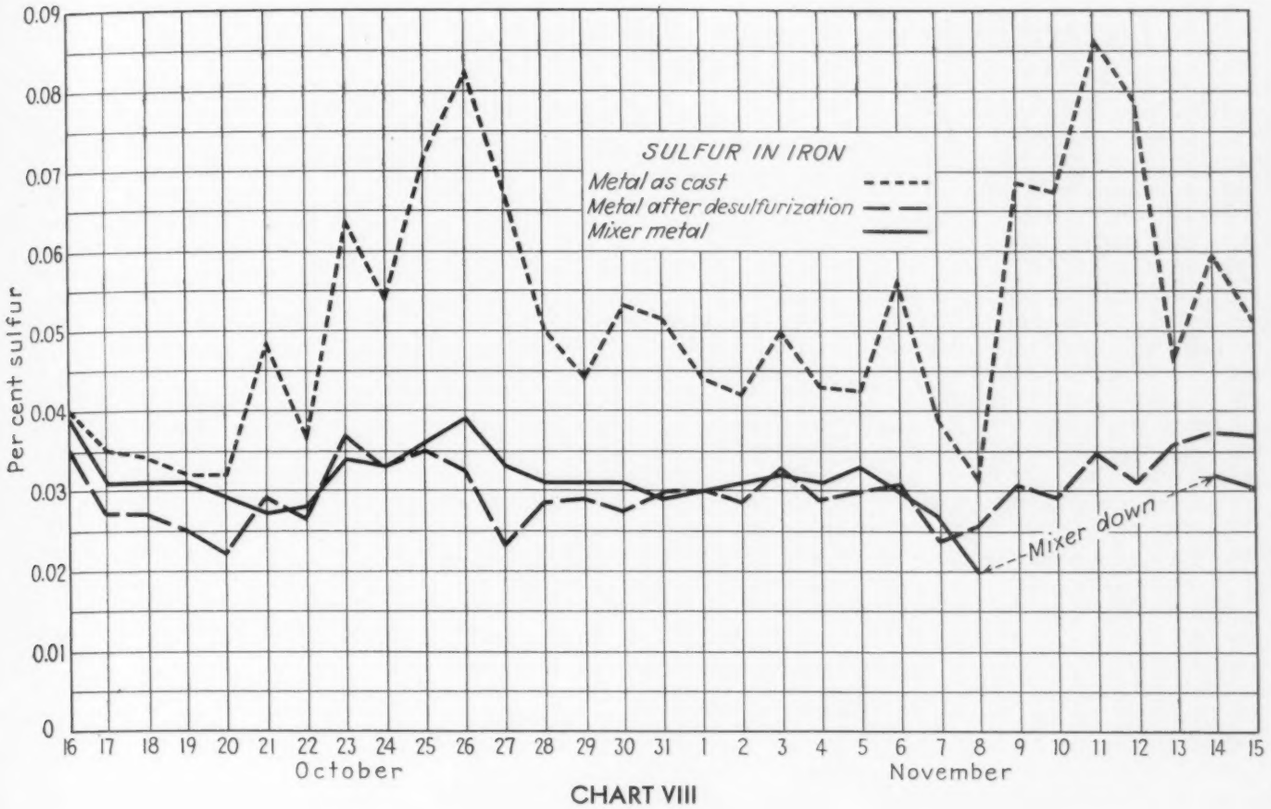


CHART VIII

fects of desulphurized hot metal on the two groups of 45 heats previously mentioned, a further study was made on open hearth statistics compiled on a monthly basis. The results of this study are presented in Chart VIII (reproduced herein).

Although some hot metal was transferred directly to the open hearth during the test period, most of the iron came from the mixer. Consequently, the values presented for the period of the test, Oct. 18 to Nov. 19, 1940, involve heats made with a mixture of iron both untreated from No. 2 blast furnace and treated iron from No. 1 blast furnace, since the product from both furnaces was fed into the mixer. The other monthly averages show production on heats made with normal untreated iron from both blast furnaces.

The first month to be considered is September, 1940, which is the last complete month immediately before the time of the desulphurization test. The figure of 13.51 tons per hr. during this time is the highest tonnage rate for the months presented. It is felt that this fact is mainly due to two conditions; first, the percentage of hot metal used in the mix, and second, the number of furnaces operated. The 54.21 percentage of hot metal for September is the highest rate encountered in the comparison and 7.21 is the smallest number of furnaces operated. Increased furnace speed due to higher hot metal charges is too well known to need elaboration. Other figures presented are about the general average to be expected.

It was considered possible to take the test period of 33 days and consider it along with the other monthly figures for comparison. In contrast to other months when the iron was rather uniform throughout the month, some irregularities in the iron were encountered during Oct. 18 to Nov. 19, 1940. Unsatisfactory furnace operations on No. 1 blast furnace, as explained in the paper entitled "Operation of a Blast Furnace for the Production of High Sulphur Iron," resulted in iron being delivered to the open hearth with a silicon range of 0.42 to 1.25 per cent. The sulphur was likewise very irregular; however, since the hot metal was desulphurized before use, the iron delivered to the open hearth was lower in sulphur than for any of the other periods. As may be expected, variations in iron temperatures accompanied the above mentioned silicon variations. In spite of these difficulties, the figures for the test period are very much the same as found for the average month.

Conclusions

The foregoing comparisons of open hearth heats were made in a manner that attempted to eliminate as many variables as possible.

The resulting tables were considered to be a measure of the effect of desulphurized hot metal on open hearth operations.

The conclusion was reached that desulphurized iron does not adversely affect the open hearth operations. This is further substantiated by the opinions of the melters who felt that if the analysis and temperature of the iron were similar to that normally obtained, then the furnace operation would be satisfactory.

As previously mentioned, no detrimental effect on steel quality was found during the entire test period.

Thus the answer to the question of whether desulphurization is practical in American practice is—yes, in many cases, and especially where the coke has high sulphur, and also where the steel plant demands exceptionally low sulphur in the hot metal, below 0.020 per cent, for instance.

Determining Corrosion Resistance of Iron and Steel

AFTER a brief review of the corrosion resistance tests of Palmaer, Brennert and Sjovall, and their limitations, S. Johansson puts forward a very sensitive method of his own, in Jernkontorets Annaler, 1940, vol. 124, No. 11.

According to a translation of the Iron and Steel Institute (British), the development kept the following objects in view: (1) The dissolved iron was to be kept in solution so that there would be no "complications" such as rust formation; (2) the determination of the dissolved iron at regular intervals without interfering with the course of the corrosion must be possible; and (3) the time required for the test was to be reasonably short. In the first tests sodium-chloride solutions of varying strength were used with additions of 0.02 per cent of calcium ferricyanide and 1 per cent of gum arabic. The ferrous ions dissolved from the specimen with the calcium ferricyanides forming Turnbull's blue (ferrous-ferricyanide) and the gum served as a protective colloid to hold the double salt in solution.

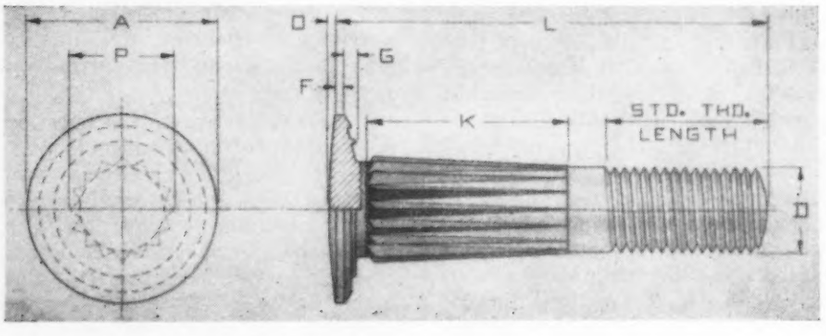
It was found possible by this method to hold 1 to 2 mg. of iron in clear solution in 50 c.c. of liquid. The amount of iron could be determined by colorimetry at suitable time intervals. Accurate and reproducible results were obtained by this method with a large number of steels, but it had nevertheless two disadvantages. With high concentrations of dissolved iron some oxidation to tervalent iron occurred, causing the determinations to be too low, and no relationship could be established which governed the concentration at which this oxidation began. Secondly, the small addition of calcium ferricyanide appeared to have a slight accelerating effect on the corrosion, especially with the high alloy steels. The method was therefore modified so that the dissolved iron would be fixed in bivalent form by the addition of an organic compound, either dipyridyl or phenanthroline; both of these form exceedingly stable, cherry red, complex salts with ferrous ions.

These colored solutions are very suitable for colorimetry, as the color is quite strong, even in very dilute solutions. Even a few millionths of a gram of iron in 50 c.c. will cause an appreciable color. The two compounds are of about equal value in this respect, and, using either one or the other, no oxidation to tervalent iron takes place; there is also no need to add gum arabic. Colorimetric determinations are made with a photoelectric cell and as little as 10^{-5} gm. of iron in 50 c.c. can be determined without difficulty. With specimens of ordinary steel 100 to 200 sq. mm. in area, an iron determination can be made after only a few minutes; certain stainless steels with an area of 1000 to 2000 sq. mm. require a few hours, and steel with a very high corrosion resistance requires a longer time. An addition of 1.5 c.c. of a 1 per cent aqueous solution of phenanthroline will fix at least 1 mg. of iron as a complex.

New Bolt Gives Water-Tight Seal

A NEW bolt for wood construction has been placed on the market by Lamson & Sessions Co., Cleveland. No counterbored hole is required in any application. Beneath the head of the bolt are two concentric, annular rings or ribs, the inner ring deeper than the outer ring. (See accompanying illustration.) When applied, these rings compress the wood fibers gently, without splintering, and form a water-tight seal on the surface around the bolt head.

In addition to this head-end seal, an additional seal against moisture is provided by the tapered form of the bolt shank with its tapered splines. Moisture will not follow the root or valleys of the splines because these also taper, their diameter increasing as it approaches the head. At the same time the splines pack the wood fibers tightly between them, making it extremely difficult for moisture to follow along the bolt shank. This feature compensates for atmospheric changes and also for any loosening action which might be encountered.



Because of the tapered splined shank, the bolt cannot be turned in the bored hole.

The company asserts that possible splintering of the wood is fully overcome by the design of the bolt. Uniform high tensile strength and uniform quality are other features.

Still Tank Pickling

—This article is written particularly to help platers to participate in the National Defense Program. Its chief purpose is to cover general pickling practice and to assist the plater in meeting additional job pickling requirements.

By JAMES P. ApROBERTS
Engineering Department, Lockheed Aircraft Corp., Burbank, Cal.

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THE chief reason for cleaning and descaling metal prior to plating is to improve the durability of plated coatings. Since this has been found to depend upon the adhesion between the base metal and the electrodeposit, a considerable amount of study and research has been made upon the means of obtaining a suitable bond[1]. The results of this work show that the best and firmest bond between the work and the coating exists when the first layer of the coating is in direct contact with the metal itself. Of course the only way for this to occur is after all dirt and scale have been removed.

The removal of scale and rust, or as the chemist would say, metallic oxides and corrosion products, by chemical or electrochemical action, is commonly known as pickling, and sometimes more correctly as descaling. Pickling differs from the more general term, "cleaning," which involves the removal of dirt, grease and other films, as well as rust and scale. Passivating is often confused with pickling because acid baths are commonly employed for both. Actually, passivating is not a cleaning process either, but is the development of a protective coating which may interfere with rather than assist in plating.

At present there are three general methods employed in the removal of rust and scale: (1) Mechanical action (scouring or sandblasting), (2) electrochemical dips (electropolishing and electropickling), and (3) immersion in still tanks.

Mechanical Methods

(A) Sandblasting: This process is a surface cutting operation, hence it may serve the dual function of both cleaning and pickling at the same time. However, a hydrofluoric acid pickle is sometimes necessary to follow up sandblasting in order to remove imbedded particles of sand. This method is not satisfactory if a smooth surface is desired, and sandblasting is usually more expensive than pickling as a method of scale removal. Another disadvantage is in the intense and highly localized action whereby accessible parts may be worn undersize or even perforated, and on the other hand, inaccessible parts may remain unaffected. Of course, there is also the ever present danger of dust silicosis.

The four main advantages of sandblasting are: (1) Less limitation as to the size of work which can be handled; (2) freedom from the possibility of hydrogen embrittlement; (3) speed of action; and (4) possibilities for treatment of localized rust and corrosion areas.

(B) Scouring: While sandblasting has been mentioned as a typical example, the same discussion would apply with almost equal force to other methods of abrasion. Two interesting applications of the scouring principle are: the Hydro Blast of the American Foundry Equipment Co. and the Roto Blast of the Pangborn Corp. In the Hydro Blast, a stream of sand and water is played upon castings under high pressure while they are being tumbled in a rotating barrel. In the Roto Blast, steel shot or other abrasives are propelled by centrifugal force against the work. Other methods such as grinding and wire-brushing obviously belong in this category. In each case, abrasives harder than the scale encountered are required in order

to remove the scale by physical force.

Lack of space prohibits any discussion of electrochemical methods of scale removal. One phase of this, "Electropolishing," has been discussed in THE IRON AGE, issues of Dec. 21, 1939; Jan. 11, 1940; April 11, 1940; Dec. 26, 1940; Jan. 9, 1941.

Still Tank Pickling

The expensive equipment required for the application of mechanical methods is eliminated in still tank pickling, since it is only necessary to provide an acid-proof container. As compared with the electrochemical method of pickling, the still tank method requires no exterior source of current, hence there are no problems of racking, current density, throwing power, or voltage control.

In a chemical dip, the metal is immersed in a solution of one or more of the following acids: hydrochloric, sulfuric, nitric, hydrofluoric and possibly acetic and phosphoric, or even chromic. The choice of formula, as shall be seen, depends upon the nature of film encountered.

Formerly, the action of the acid was considered to be hastened by the use of "promoters" such as arsenic or mercury. This practice is now being discouraged since it has been found that hydrogen embrittlement was also "promoted" as the result of an increased attack of the acid on the base metal.[2] Heating the solution as high as 1700 deg F. is a more satisfactory means of accelerating the action. This is done by using acid-proofed steam coils, or by piping live steam directly into the solution, or applying heat by some external means. Heating beyond 170 deg. will tend to cause excessive evaporation and may impair the effectiveness of additives such as "inhibitors," which will be discussed later. An interesting point to be observed in this connection is the effect of temperature on the speed of pickling. As a general rule, it varies greatly with the temperature of the pickling bath, doubling its speed with every 14 to 17 deg. rise in temperature. The speed on ordinary low-carbon steel (open hearth process) at 170 deg. is about five times as fast as it would be at 140 deg. F. On some other alloys and bessemer steels, this rate is even faster, so that even 180 deg. is sometimes too hot for a good job unless a strong inhibitor has been added to suppress the action on the base metal.

Pickling Formulas

The acid to be used is determined by the nature of the scale to be removed from a particular metal. Of the previously mentioned acids, sulphuric, hydrochloric and hydrofluoric are used on steel and iron: while sulphuric, nitric and dydrochloric are employed for brass. The use of acetic and phosphoric acids appears to be limited, although the latter offers the added advantage of creating a metallic phosphate film which gives better paint adhesion and corrosion protection but does not improve plating. Magnesium is currently being given a chrome-pickle (sodium dichromate plus nitric acid) or it is treated with hydrofluoric acid to remove surface films and to offer improved corrosion resistance[3]. In this connection, it would be well to mention that treatments which are applicable to magnesium, such as the hydrofluoric acid pickle, have an adverse effect upon aluminum, and vice versa. For instance, nitric acid passivates aluminum, but dissolves magnesium at an alarming rate.

The following formulas will serve to illustrate these points:

BRASS: Preliminary dip to remove oxide scale produced by hard solder or brazing.[1]

8 oz. of 66 Be. sulphuric acid per gal. water:	
(scaling dip—oz. per gal.)	(bright dip)
48.0—66 Be. sulphuric	54.00—H_2SO_4
9.0—40 Be. nitric	9.00—HNO_3
0.5—20 Be. hydrochloric	0.25—HCl
68.0—. . of water	61.00—H_2O

Another bright dip is made up as follows:

sulphuric—2 gal.
Nitric —1 gal.
water —1 qt.

NOTE: Both of these bright dips rely upon the presence of hydrochloric acid, which is added to the last mentioned solution in the amount of 1 oz. for 5 gal. An excess of HCl will cause the work to come out spotty. Addition of wood soot will correct this effect by adsorbing the excess chlorine.

The 1940 Plating and Finishing Guidebook[4] also mentions these as suitable pickles for copper and copper alloys:

Sulphuric acid pickle:

H_2SO_4—1 part	Temperature 150
H_2O—4 parts	to 175 deg. F.

Bichromate pickle:

H_2SO_4—1 part	Temperature 140
Na_2CrO_4—2 oz. per gal.	to 160 deg. F.,
H_2O—4 parts	or may also be used cold, i.e. room temperature.

NOTE: Bichromate pickle is not suitable for subsequent plating, since the chromium passivates the metal and impairs the adherence particularly of nickel deposits. A bichromate dip will also "decopperize" or increase the zinc content of the surface and thereby give the base metal a lighter than natural shade. The corrosion resistance is somewhat improved.

The foregoing condition can be remedied by using a solution of from 2 to 4 per cent sodium cyanide (NaCN), which will remove the stains and thus perform as an "alkaline pickle" in contrast to the "acid pickles" which are being discussed in this paper. Hydrochloric, also known as muriatic acid, is sometimes used to "wash off" the excess zinc and the chromate layer.

A "fire off" or "scaling dip" for preliminary smoothing of brass may be made up as follows[4]:

H_2SO_4—2 gal.
HNO_3—1 gal.
H_2O —5 gal.

Iron castings are occasionally dipped in a 20 per cent solution of hydrofluoric acid (HF) to remove imbedded or "burnt off" sand particles[5]. They are also generally pickled by concentrations of between 5 to 15 per cent sulphuric acid, which is usually heated from 120 to 180 deg. F. with or without the use of an inhibitor, the latter factor depending upon the duration of the immersion. Hydrochloric dips range from 7 to 20 per cent by volume and, for some plating purposes, these limits are often exceeded at either end and are untalysis[6].

An important factor to be observed in the pickling of steels is the alloy content. The presence of carbon in the form of iron carbides accelerates the solution of iron in acids, as is shown by the occasional presence of carbon particles (soot or "smut"), particularly on the surfaces of high carbon alloy steels.

In electroplating, the solutions are generally discarded much before the content of iron sulfate or chloride attains a concentration of even 5 per cent; because it is felt that rinsing difficulties may arise

from the precipitation of iron stains (basic ferric salts) on the work in the rinse tank. In this connection, it would be well to note the practice, still alleged to be followed by some old-time picklers, of throwing some of the old pickling solution back into the new bath—possibly to pay tribute to the effectiveness of former baths or else because of some unexplained catalysis[6].

Actual choice of the pickling solution, aside from the alloy content of the steel, depends upon the nature of scale and other corrosion products which are to be removed prior to plating. In some cases, the surface material is a combination of two or more corrosion products, and in such instances more than one acid may be necessary to completely descale the work. For example, the following two-component formula is used on iron castings with sand particles: 6 to 8 per cent sulphuric acid and ½ to 1 per cent hydrofluoric acid at a working temperature of around 140 deg. F.[5] Perhaps even more illustrative of this is a solution used on the smooth pickling of stainless steel. The oxides which are formed on these metals at high temperatures during annealing, soldering or welding, will alter the normally passive (corrosion resistant) coating and create a complex mixture of the various oxides of iron, nickel and chromium. The removal of these oxides is best solved by the use of a ferric sulfate-hydrofluoric acid mixture wherein the ferric sulfate content varies from 6 to 12 per cent and that of the acid 1.5 to 3 per cent, according to the type of stainless steel used, such as hot rolled sheet, cold rolled strip or tubing[7].

Regardless of the metal being pickled, when treating assemblies or other parts likely to be hollow, such as sealed tubing, caution must be taken to see that acid is not entrapped where it will have a corrosive effect, or be apt to slowly trickle out and either interfere with processes following or else stain the work, usually doing both. This may be prevented by locating any holes in the work and closing them with "kalons" or set screws.

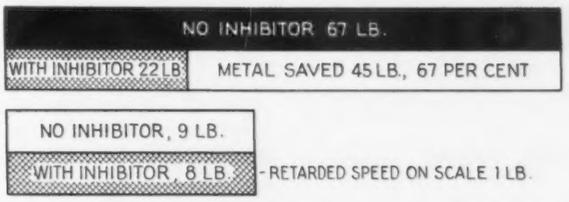
Another point which must be taken into consideration is the use of inhibitors. By this is meant a substance which, in the words of O. T. Towner,[5] "will permit the removal or rapid solution of the various scales or oxides by an acid, and retard the action of the acid on the metal itself." In other words, the purpose of an inhibitor is to save the base metal, as is shown in the following illustrations.[8]

The mechanism of an inhibitor is that the inhibitor, being a finely dispersed colloid, will surround and adhere to the metal. The pickling acid will react on the scale and form a ferrous or ferric salt which dissolves in the bath. Its action on the base metal, which ordinarily liberates hydrogen, will not occur to as great an extent, since the inhibitor prevents this hydrogen formation or further oxidation. Zappfe and Faust[2] showed that inhibitors are effective in protecting the base metal from acid attack, that they also keep hydrogen from diffusing into the base metal and becoming occluded therein, and that they have a definite effect upon preventing hydrogen embrittlement.

product, Turco Acryl, which deserves mention here since it conforms to the United States Navy Department Specification 51-1-2a, covering the requirements for inhibitors. This specification is of interest because it describes the performance characteristics of a good inhibitor.

(1) In order that the inhibitor will not interfere with subsequent electro-deposits, it must be non-staining and free rinsing. This means that such an inhibitor will be freely miscible in the pickling acid. It must create no tarry suspension or oily film upon the surface or sediment which would be deposited on the work, thus causing grief for the plater.

(2) It must be of the non-foaming type. This property is especially important since a layer of foam would obscure the visibility of the work in the pickling tank,



Illustrating the effect of inhibitors on the action of the acid on scale.

Illustrating the effectiveness of inhibitors in conserving acid.

BATH: 66 deg. Be. sulphuric acid, 5 per cent water; 95 percent with and without added inhibitor, Turco Acryl 0.1 per cent.

To sum up the functions of an inhibitor, it may be said that:

(1) It does not interfere with the normal operation of the acid.

(2) It prolongs the life of the acid, since less metal is dissolved and the amount of iron salts accumulated is smaller.

(3) It saves the base metal and helps to prevent over-pickling.

(4) Not only does it prevent embrittlement, but it also helps to preserve the bright smooth original iron or steel surface, and thus aids in obtaining smoother, brighter electrodeposits.

Several inhibitors are on the market. Typical of these is a local

necessitate more rigorous rinsing or even further cleaning, and offer a potential hazard from sparking of the hydrogen gas filled bubbles. Injuries have resulted from explosions of these bubbles, since the acid is scattered in all directions.

(3) A satisfactory inhibitor must be non-poisonous and must yield no toxic fumes or gases when mixed into the pickling bath. It must not react with nascent hydrogen to form poisonous gases such as HCN (cyanide fumes), PH_3 (phosgene), AsH_3 (arsene), H_2S (hydrogen sulphide) or Cl_2 (chlorine).

(4) The effectiveness of the inhibitor is best stated in the abovementioned specification, which is quoted from as follows: "When used in the proportion of 1 per cent inhibitor to actual acid, the in-

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hibitors shall have a merit value of not less than 1.10. (Note: this means that it shall be 10 per cent more effective in inhibiting base metal removal than the standard comparison inhibitor (diorthotolylthiourea). To safeguard against greatly increased pickling cycles, which would add to the labor cost in pickling, the life of the processed bath shall not be more than four times the life of the plain acid bath for an inhibitor to be acceptable."

This shows that although an inhibited pickling solution has a much longer effective life, it does not greatly increase the pickling cycle. Hence, the only unusual thing about the current use of inhibited pickling solutions is that these are not being used more extensively in the electroplating industry.

In conclusion, simple dip pickling, particularly when the solution is inhibited, offers many advantages over the other methods of scale removal. The necessary equipment is simple. Control of pickling solutions was likewise shown to be elementary; the chief methods employed in refining or strengthening the solution are either addition of a suitable adsorptive agent such as wood soot[4], or strengthening the solution by merely adding more concentrated acid. Of course, the common practice among electroplaters is to throw out the solution as soon as it becomes too sludgy or the pickling time cycle is too long.

Although there are many solutions in common use today, they vary according to the metal scale to be removed and are relatively simple in their composition. The two main drawbacks to pickling are overpickling and hydrogen embrittlement. The former can be satisfactorily overcome by properly inhibiting the solution, which also helps to avoid the latter trouble. Inhibiting was further shown to be an economical means of controlling the removal of base metal and increasing the life of the bath.

Acknowledgment should be made of the help given by Howard Sipple, T. E. Tooney of the Engineering Department and others of the Lockheed Aircraft Corp.

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Flake Formation in Alloy Steel

A BRIEF outline of the theories put forward to account for flake and hairline crack formation in steel, was presented by J. M. Robertson in the Iron and Coal Trades Review, 1941, vol. 142, pp. 117-118. According to the Iron and Steel Institute (British), the author also dwells in particular on the hydrogen theory and compares this with the thermal-stress theory.

It has been calculated that 0.001 per cent of hydrogen remaining in steel is sufficient to produce rupture at 392 deg. F. The hydrogen theory provides an explanation of the observation that once a bloom has been made non-susceptible by slow cooling, flakes cannot be produced by later forging or cooling treatment. The thermal stress theory would not explain this. The hydrogen theory, on the other hand, does not seem to account for the way in which the susceptibility to flake formation varies from one type of steel to another. There is no evidence that alloy steels contain more hydrogen than carbon steels, nor that the hydrogen content tends to increase with the alloy content. The relation between the hydrogen which diffuses out to the surface of the metal and that which diffuses into cavities is not clear. It is supposed that, during slow cooling, the hydrogen escapes from the metal at the surface, but to reach the surface it must pass the cavities, and it would therefore be easier for it to diffuse into the cavities than to go to the surface.

The hydrogen theory appears to be more satisfactory and has been more generally accepted than any other theory relating to flakes. The thermal stress theory has been regarded as a rival to the hydrogen theory, but there is no reason why the two should not be combined. When this is done, it is seen that practically every aspect of the phenomena associated with flakes can be explained.

The author deals next with hardening cracks and explains why these cracks are not produced when a steel part is first immersed in the quenching medium, but actually develop when the interior cools to near room temperature and the martensite change is approaching completion. Alloy steeds are less liable to develop hardening cracks than carbon steels. One reason for this is that the general run of alloy steels contains less carbon than the carbon steels that are heat treated commercially; this is so because it is possible to suppress the normal changes in alloy steels of low carbon content much more easily than those in plain carbon steels of similar carbon content.

Basic Open Hearth

By J. H. CHESTERS
Central Research Department, United Steel Companies Ltd., Stocksbridge, Near Sheffield, England

—Construction data and refractory technique above the sill plate level. Last week attention was directed toward the roof—herein, data deal with the back and front walls, gas and air ends, and the ports.

The Back Wall
(Section 12)

(A) **CONSTRUCTION:** Back walls may be divided into two main classes: those which have a vertical inside face and those which slope outwards. The fully sloping back wall (Naismith) is generally made slightly steeper than the expected angle of rest of the fettling material, which is generally taken to be 48 deg. to the horizontal. In some furnaces semi-sloping back walls intermediate between the vertical and the Naismith types are employed.

Vertical back walls are built in various ways, a common type of construction employing 14x4½x3 in. header bricks. Bonded walls (header and stretcher courses) using 2½ in. or 3 in. squares are also common. In general, the bottom section of the wall is made thicker, say 18 in. instead of 14 in., in order to provide stability and reduce the risk of under cutting due to attack at the slag level. Good results have also been obtained by the use of metal-case magnesite or chrome magnesite bricks.

Some form of reinforcing is desirable to reduce the risk of the back wall falling inwards when under cut at the slag line. For this purpose, steel strips inserted at intervals between the bricks and twisted over rods set at slots in the vertical buck stays, as shown in Fig. 11, have proved convenient and efficient. The tendency to fall inwards can also be further reduced by building bricks on the "batter," i.e. at a slight angle to the horizontal and in such a way that the wall tends to fall outwards rather than inwards. In general, at least two vertical expansion joints are left in the back wall. These are kept clear and generally close up during the early stages of the campaign. As with silica bricks, the amount of expansion left is approximately equal to the thermal expansion of the bricks up to 1000 deg. C., i.e. approximately 1 per cent or ⅛ in. per ft.

(B) **Materials:** Until recently silica bricks were normal for back wall construction, but the development of various improved basic refractories of high thermal shock resistance, has led to the replacement of silica bricks in most furnaces. In Great Britain back walls are now mainly constructed of chrome magnesite bricks, although excellent results are still being obtained with metal-case magnesite tubes set either close together or separated by considerable quantities of cement. No specifications are available for chrome magnesite bricks, but bricks whose porosity is greater than 28 per cent or whose cold crushing strength is less than 1000 lb. per sq. in. are suspect.

Forsterite bricks have also been used with some success and are found to give a life of approximately two-thirds that of a chrome magnesite back wall which is considerably greater than the life obtained with silica bricks. In the United States considerable use has been made of unfired chemically bonded chrome-magnesite and magnesite-chrome bricks.

A great deal of research has been done on the use of dolomite bricks of moderate spalling resistance, both of the stable and partially stable types. The results obtained have been quite encouraging, but any prediction of comparative life would be premature.

With sloping back walls, almost any refractory brick can be used since it is protected by the dolomite or magnesite fettling mate-

rial, but a basic brick is preferred since its use greatly reduces the risk of reaction between brick and fettling if the latter becomes thin.

With tilting furnaces, the back walls are generally made of magnesite or chrome magnesite bricks and large amounts of parging cement generally of a 1:1 or 3:1 chrome magnesite composition, are employed. Silica bricks cannot be used since during tilting the back wall is covered by a highly corrosive basic slag. The properties of typical bricks used in the construction of back walls are set out in Table II.

(C) **Life and causes of failure:** In general the life of a vertical chrome magnesite back wall in a fixed furnace is about 13 weeks. A certain amount of patching can be carried out, though with chrome magnesite bricks in particular, such patching is difficult due to the risk of disturbing the remainder of the wall. Where silica bricks are used the life rarely exceeds three weeks. Considerable experience shows that for most installations, chrome magnesite bricks are more economical than silica bricks since:

(1) Silica bricks must in any case have basic bricks as a base.

(2) Repairs are less frequent with chrome magnesite walls and labor costs therefore lower.

(3) The strain on the roof, due to frequent back wall repairs, is eliminated.

(4) There is less cut in the banks due to silica drip.

(5) Higher working temperatures are possible.

The above advantages are all too obvious when an attempt is made to return from the present practice to the use of silica back walls, excessive cut on the banks and a very short back wall life being obtained because the continued use of chrome magnesite back walls and ports has unconsciously led to harder driving of the furnace. The life of forsterite bricks in similar furnace walls is generally about 8 weeks and that of metal-case bricks between 13 and 26 weeks. Sloping back walls last almost indefinitely provided they are properly fettled.

Analyses of used bricks show that most of the chemical attack is due to iron oxide and lime and not to splashing of slag from the bath. Thus the silica content of used chrome magnesite bricks is often lower than that of the original material. With such bricks most of the damage appears to be due to bursting caused by solid solution of iron oxide in the chrome grains. Whole areas of the wall may shell away, particularly if the furnace is cooled to room temperature. The pick up of lime from the limestone or dolomite charge probably tends to reduce bursting by fixing part of the iron as calcium ferrites. The top section of the back wall is attacked, often seriously, by silica drip from the roof, and this is one of the main problems in the application of bricks having a dolomite base. The wear at this point is also increased due to a tendency of the flame to rise into the angle between the roof and the back wall leading to excessive erosion and corrosion, particularly above the tap hole. The wear is generally worse here and at the slag level where the fettling material dissolves in the basic slag. Ground chrome ore is often used to protect the toe of the skew back by filling the gap between the silica roof and the basic back wall.

At one time a neutral course between the back wall and the hearth was considered essential. With the use of chrome magnesite bricks this is no longer necessary, and even with silica bricks such a neutral course is probably better replaced by a thick joint of chrome cement.

With forsterite bricks no bursting is observed, but there is a marked change in the chemical composition of the working face. Reaction between iron oxide from the furnace and the olivine ($2(Mg,Fe)\ O.SiO_2$) leads to the formation of a black phase of magnesio-ferrite ($MgO.Fe_2O_3$). The gray zone behind this is still found to consist essentially of forsterite. How much of the silica leached out of the working face goes into the brick, and how much into the bath, is still not clear.

(D) **Lines of improvement:**

(1) More general use of the sloping back wall.

(2) The production of chrome magnesite bricks of low permeability and low bursting expansion.

(3) The extension of the practice of using tarred calcined dolomite either preformed in large presses as used at certain basic bessemer plants, or rammed *in situ* as a monolithic wall.

The Front Wall

(Sections 13, 14, 15 and 16)

(A) **Construction:** The front wall consists of a series of pillars on the stage side of the furnace, together with the door frames and doors, of which there are generally three on an 80-ton furnace, and five on larger furnaces. The general method of construction is similar to that employed in the vertical back wall but there are certain differences arising mainly from the fact that the door jambs must withstand considerable abrasion from the charger. Fig. 12, which shows a furnace being charged, illustrates the difficulties liable to arise when large pans filled with bulky scrap pass through the furnace doors. In general, the front wall is 14 in. to 18 in. thick, and is tied-in in a manner similar to that already shown with the back wall. The division of the wall into separate pillars is a definite weakness, since any local under-cutting of the banks tends to result in the corresponding pillar tilting inwards. The effect can be minimized by building the walls thick at the bottom, and where possible on the "batter," and sloping outwards on the inside face. The door jambs should also slope outwards towards the top to give increased stability. The door arches, which are generally silica, are a point of weakness though some increased stability can be obtained by the use of tongued and grooved blocks, which prevent any given section from slipping out vertically.

Sloping front walls, similar in principle to the Naismith sloping back wall, have also been suggested, but their application to existing furnaces is difficult since, unless a loss in bath capacity is to result, the furnace will protrude inconveniently over the stage. In one arrangement, patented by Naismith, the front wall as such virtually disappears, being replaced by a series of sliding doors. In most new installations, the door frames and often the doors themselves are water cooled. This makes for a more robust construction, adds to the comfort of the operators, and increases the door life.

(B) **Materials:** The materials

used are similar to those employed in the construction of back walls. With most British furnaces, the front wall is built of chrome-magnesite bricks, though at some plants the use of silica bricks is still considered economical. The base of the front wall is frequently parged with ground chrome ore above the level of the dolomite fettling.

The properties of a number of typical door bricks, all of which have given excellent service, are set out in Table III. The most characteristic features would appear to be the high thermal shock resistance (30+ in all cases) and the refractoriness which is never less than 1680 deg. C. (3056 deg. F.). In view of the great thermal shock which the bricks receive when a new door is placed in position and the frequent changes of temperature when the doors are raised and lowered, the desirability of having bricks of high thermal shock resistance is evident. Silica bricks are more suitable from the point of view of resistance to the furnace atmosphere, but are liable to spall unless heated up slowly as with a new furnace. Since the furnace temperature is frequently as high as 1680 deg. C. (3056 deg. F.) and since flame periodically impinges on the front wall due to deflection by bulky scrap, it is surprising that a refractoriness of even 1680 deg. proves adequate, and not surprising that some of the recent records have been made by bricks of the high alumina type.

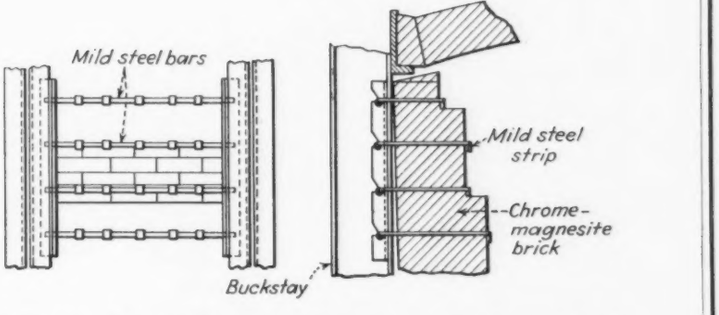

FIG. 11—Section through basic open-hearth furnace back-wall, showing the method used for tying-in the bricks.

(C) **Life and causes of failure:** The pillars in a front wall generally last a campaign, i.e. about 13 weeks, but the door jambs and door arches need much more frequent replacement. Unfortunately, such repairs must often be done while the furnace is in operation and even with the great skill shown by the bricklayers, a jamb built under such arduous conditions is bound to have a shorter life than that of the original brickwork. Much can be done to prevent immediate spalling by boiling the silica bricks in tar prior to use. The practice of using fireclay bricks for hot repairs to jambs, which is resorted to in extreme cases, is most undesirable, since an odd brick falling on to the hearth may be sufficient to cut a hole through it and allow the contents of the furnace to tap into the checkers. The life of the doors is particularly short, being as low as 80 hr. on some furnaces, but as long as three weeks on other furnaces where the doors are water cooled. Apart from the chemical action of iron oxide and lime, the front wall suffers considerably both from abrasion and vibration. Door arches and jambs are frequently scoured by scrap if not actually hit with the charging pan. The pillars get undercut and are very difficult to fettle except during the week-end shut down. The alternate cooling and heating of the doors and door jambs when the doors are raised and lowered adds thermal shock to the other factors, tending to decrease front wall life.

The following analyses of used door bricks (both originally of the medium alumina type):

	Brick A	Brick B
SiO_2	44.04	51.44
Al_2O_3	28.64	25.88
Fe_2O_3	10.88	9.76
CaO	9.80	7.08
MgO	1.88	1.20
TiO_2	0.20	0.88
MnO	2.24	1.91

show that the main corrodants are iron oxide and lime, together with a much smaller amount of manganous oxide.

(D) **Lines of improvement:** The main problem in the front wall is one of design. Even if the sloping front wall does not prove practical it should be possible to devise some type of panel construction such as is employed on boilers, so that the various pillar bricks could be held firmly in position by steelwork and only become detached as a result of spalling. As regards materials, the chrome-magnesite brick has an adequate slag and thermal shock resistance, but leaves much to be desired as regards resistance to abrasion and as in the back wall, suffers from abnormal expansion due to the solid solution of iron oxide in the chrome.

Gas and Air Ends

(Sections 1 and 3)

(A) **Construction:** The gas and air ends suffer from the unfortunate necessity of having to turn the gases leaving the furnace through an angle of over 90 deg. (see Fig. 2) in order to send them on their way via the slag pockets to the checker chambers. This could of course be overcome by having the checkers at the ends of the furnace rather than underneath, but such construction would have several disadvantages, in particular the very much larger floor space required per furnace. As long as this sudden change in direction is necessary, considerable swirling action and consequent rapid erosion is bound to occur. Furthermore, the gas and air ends become almost slag-test panels, being continually bombarded with gases high in iron-oxide and lime. In general, these walls are built 14 in. or 18 in. thick, while in some designs, they

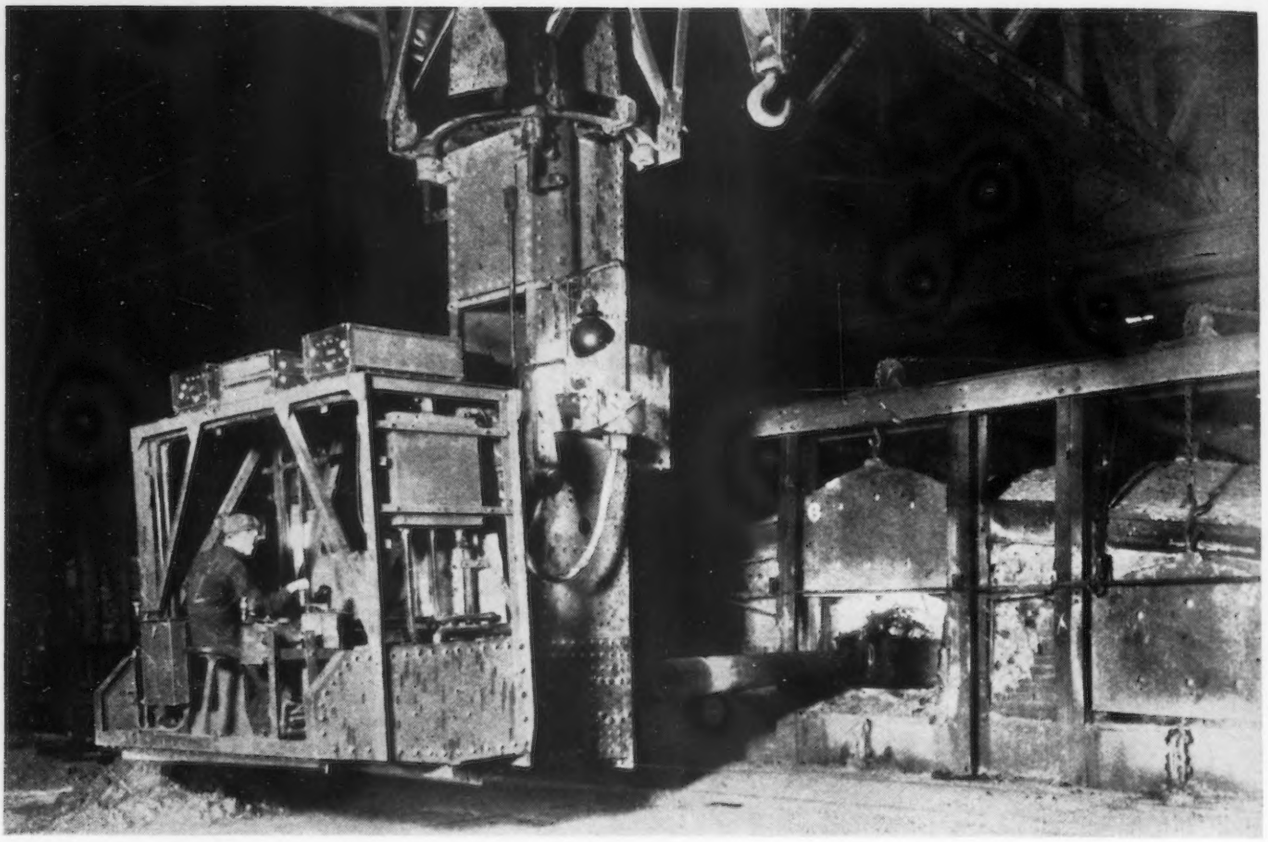

FIG. 12—The charging of an 80-ton pig fixed basic open-hearth furnace with scrap metal.

are encased at least on the sides, with steel plates, and frequently insulated. In some furnaces an attempt is made at streamlining but the main problem of the quick change in direction of the gases remains.

A further problem arises due to the necessity for periodical inspection of the gas port slope. This is usually done by knocking out a section of the gas end, some of the bricks from which fall into the slag pockets, but a better method, e.g. some type of door, is required. Such doors have been constructed, but they have in general been abandoned due to their short life and the difficulty of keeping the joint between the doors and the door jambs gas-tight.

(B) **Materials:** In general, gas and air ends are constructed of silica bricks, though both chrome-magnesite and metal case bricks have been used with considerable success. Since running repairs are possible, the question of what refractory to use depends largely on economic considerations. Where chrome-magnesite or metal case bricks are employed, it is essential that the section built of these materials be so constructed as to minimize the basic drip on to the silica bricks below, and the silica drip on to the basic bricks from the section above. Attempts have been made to build silica walls with a basic brick veneer on the inside, but these do not appear to have achieved any permanent success.

(C) **Life and causes of failure:** As already inferred, the main wear at the gas and air ends is due to erosion by hot gases and bombardment by iron oxide and lime dust. Small amounts of other materials, e.g. magnesia (from the dolomite fettling) alkalies, etc., are also picked up. Zinc oxide and lead, which are found in considerable quantities in the checkers, are too volatile to remain for long in this part of the furnace. A further complication, not conducive to long life, is the alternating, oxidizing and reducing atmosphere in the gas uptakes. In the air uptakes, the condition will in general be oxidizing. The economics of the use of basic refractories in this position are illustrated by the following example:

		£. s. d	Approximate Dollar Equivalents
West gas end	Chrome-magnesite + cement for 16 weeks	8.19. 8	$44.92
	Labor	7. 6	1.88
	Total	9. 7. 2	46.80
East gas end	Silica bricks + cement for 16 weeks	8.18. 5	44.62
	Labor	2. 0. 0	10.00
	Total	10.18. 5	54.62

It will be seen that with this furnace the chrome-magnesite bricks are definitely more economical in gas ends than silica bricks, but in studies carried out on other

furnaces, the opposite has been found to be true.

(D) **Lines of improvement:** The temperatures in gas and air ends are not particularly high, although the erosion and corrosion conditions are severe. It is, therefore, possible that bricks of equal or even lower refractoriness to those now employed may prove more satisfactory if they can be manufactured with much greater density, and with a consequent higher abrasion resistance at the working temperature.

In addition, much still remains to be done as regards streamlining and the design of a suitable door for inspection of the gas port slope.

Ports

(Section 10 A, gas port arch.)
(Section 10 B, gas slopes.)
(Section 10 C, wing walls.)
(Section 10 D, air port arches, if present.)

(A) **Construction:** The ordinary port is essentially a semi-circular tunnel passing from the gas end into the laboratory of the furnace. It is either built as a series of rings, or as a solid block of masonry with a central hole. The air is introduced at the sides or over the top of the gas port, every attempt being made to obtain rapid mixing and combustion. A large number of the recently installed furnaces have ports of special design, among which may be mentioned the Venturi port, which is self descriptive, the Maerz port which is essentially a water cooled hole in the end wall, and the Friedrich port, which includes a removable block, and is the normal design for a tilting furnace.

The Venturi, Maerz and Friedrich ports, are all in general water cooled, and are so designed as to give efficient combustion, not only at the commencement of the campaign, but throughout the run. With the ordinary port, constructed of silica bricks, the wear is so great that the port length is originally made considerably greater than the optimum, and finishes up considerably shorter than is desirable from the point of view of good flame direction. Ideally, the port should be constant in behavior throughout the campaign, but should be variable with the reversals, being larger when it is used as an exhaust port for the waste gases than when it is performing the function of a burner. The construction of a variable port has been attempted, but its development is likely to be held up by the mechanical complications involved. In general, ports are now constructed, if not of chrome-magnesite or other basic bricks, at least with a basic face. Where water cooling is employed, the port bricks generally last considerably longer and with water cooled chrome-magnesite ports, trouble may even be experienced due to building up of the refractory debris falling from the gas port arch

TABLE II

Properties of Basic Open-Hearth Furnace Backwall, Frontwall and Port Bricks

Code No.	Chrome-Magnesite M.C. 17.	Silica S. 16.	Forsterite x. 8.	Special Magnesite M. 1.
Apparent porosity, per cent	26.6	21.6	20.3	22.2
Bulk density, g. per c.c.	2.74	1.89	2.76	2.76
Lb. per cu. ft.	171	118	173	173
Specific gravity (from porosity data)	3.73	2.33	3.46	3.54
Cold crushing strength-on-end, lb. per sq. in.	1990	6350	3170	1470
Permeability to air (perp. 9x3-in. face, through 1 skin) c.g.s. units	0.036	0.043	0.037	0.088
After contraction or expansion (2 hr. at 1500 deg. C.)	0.7 per cent (exp.)	0.1 per cent (exp.)	0.4 per cent (exp.)	0.25 per cent (CO.)
Refractories under load (1600 deg. C., 25 lb. per sq. in., 1 hr.	5.7 per cent collapse	0.3 per cent collapse	6.2 per cent collapse	
Thermal shock resistance (900 deg. C. test)	30 +	1 (450 deg. C. test)	7	30 +
Notes:	12.5 per cent bursting expansion	1710 deg. melting point; 5 per cent raw quartz	Resistance to iron oxide greater than silica but less than magnesite or chrome Magnesite	Grecian magnesite base
Main application:	front walls back walls ports	front walls back walls ports	back walls	ports

TABLE III

Open-Hearth Furnace Door Bricks (Fireclay)

Code No.	F. 1.	F. 2.	F. 5.	F. 27.
Apparent porosity, per cent	25.9	21.7	23.0	18.9
Bulk density, g. per c.c.	1.94	1.98	1.98	2.05
Lb. per cu. ft.	121	123	123	128
Cold crushing strength-on-end, lb. per sq. in.	3130	4140	4110	1890
Permeability to air (perp. 9x3-in. face through 1 skin) c.g.s. units	0.46	0.013	0.009	0.40
After expansion or contraction 2 hr. at 1410 deg. C.)	0.6 per cent (CO.)	0.6 per cent (CO.)	4.8 per cent (exp.)	1.1 per cent (exp.)
Refractories under load (50 lb. per sq. in.)				
Initial softening	1360	1220	1140	1270
Rapid softening	1490	1450	1260	1410
Fail temperature	1570	1540	1440	1600
Thermal shock resistance (900 deg. C. test)	30+	30+	30+	30+
Pyrometric cone equivalent	>cone 33	30 to 31	30 to 31	34 to 35
Deg. C.	>1730	1680	1680	1760

on to the gas slope. The frequent removal of this material, which not only constricts the port, but also tends to project the flame upwards, is a difficult and arduous job, and can be largely avoided by the use of a siliceous port hole which wears away as fast as it builds up.

Both the silica and basic bricks employed in port construction are essentially similar to those used in side walls and roofs, but high quality is essential and the refractoriness under load must be watched, since port blocks, unlike the side wall bricks, are heated from all sides. Excellent service has also been obtained in Venturi ports with bricks of high thermal shock resistance made from thoroughly dead burned Grecian magnesite. Where such bricks are employed, they are separated from the silica brickwork by a neutral course of chrome bricks, but where chrome-magnesite bricks are employed, no such neutral course appears to be necessary. Neither does any difficulty arise due to differences in expansion characteristics of silica and chrome magnesite bricks. Experiments have been made in which fused alumina (98 per cent) bricks have been tried in basic open-hearth furnace ports but so far the results obtained would not appear to be particularly encouraging.

A recent development that shows considerable promise is the so-called "E and M" port (Société Anonyme d'Escaut & Meuse). In this construction the main mass of the port block consists of magnesite bricks or magnesite tamping material having a refractory supporting arch of relatively small thickness, but great strength at high temperatures. This latter in general consists of silica bricks and is separated from the mass of the port by a neutral layer of chromite. In general, some flux is used to facilitate the sintering of the magnesite grains. It is claimed that the supporting arch of silica wears away only at the block nose, thus forming a port whose working face is basic, but whose strength lies in the silica bricks, which are prevented from reacting with the magnesite above by the neutral course of chrome. A somewhat similar idea which has been applied for many years is the so-called Scotch block. This is a technique for repairing a port while the furnace is still hot by placing in position a steel template of the shape of the inside of the gas port arch and ramming over this a mixture of crushed silica bricks bonded with a gum such as sulphite lye or dextrin. Instead of crushed silica bricks, sand or ganister can also be used, at least as part of the batch.

FIG. 13—High alumina bricks removed from the door of a basic open-hearth furnace, showing localized erosion and corrosion.

(C) **Life and causes of failure:** The life of a port generally coincides with the 13-week campaign on an 80-ton furnace, but considerable patching is carried out with the ordinary port and for a large part of this time the port cannot be said to be in good condition. The erosion due to the high velocity of the exit gases is very great, particularly if the flame is too long and reaches to the mouth of the exit port. The concentration of iron oxide and lime at the gas port mouth is probably as high as anywhere in the furnace atmosphere, and in view of the high average temperature of the port bricks it is surprising that the life obtained with silica blocks is as great as it is. The salvation of the silica brick in this position would appear to be its ability to absorb large quantities of iron oxide without any great drop in melting point, and its high refractoriness under load.

(D) **Lines of improvement:** The port affords an excellent example of the principle that the value of a brick cannot be measured entirely in terms of the life obtained. It would be economical to pay a far higher price for port bricks if these were able to give even twice as good service as that now obtained. Ideally, such bricks should enable a stream of gas to be projected on to the bath in the same way throughout the campaign and without the necessity of wasting heat (and water) by the extensive use of water cooling. Until such improved basic refractories are forthcoming the "E and M" type of construction would appear to be among the most interesting, since it might well be constructed of cheaper material than magnesite, e.g. of suitably graded calcined dolomite.

Ed. Note:—This article will be continued in a future issue.

Acknowledgment

The author wishes to express his thanks to Dr. T. Swinden, director of research, the United Steel Companies Ltd., for permission to publish this article, to Iron and Steel Industry, the Iron and Steel Institute and the British Ceramic Society for permission to reproduce Figs. 3, 4, 5, 7, 8, 9, to Mr. Percival Smith for the furnace photographs, and to Mr. J. Pluck for the drawing reproduced in Fig. 2.

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Panel on Technical

OF particular importance today are methods to reduce the consumption of ferromanganese without seriously affecting steel quality. At the annual convention of The American Iron and Steel Institute last week in New York, this problem was ably discussed by Mr. C. H. Herty, Jr., research engineer, Bethlehem Steel Co.

Mr. Herty pointed out that the country's consumption of standard ferromanganese, about 15.5 lb. per net ton of steel, is dictated by four conditions.

(1) Specifications set by the consumer.
(2) Specifications set by the producer to meet physical properties.
(3) Specifications set by the producer to give the optimum rolling conditions.
(4) Open hearth practice as regards charge, working of the heat and deoxidation practice.

Thus, in (1), manganese specifications set by the consumer can be revised downward by balancing the lowered manganese with increased carbon and/or silicon. This rebalancing of composition may, in many cases, require a modification of heat treatment, or a slight revision of existing specifications on certain physical properties such as the tensile specification on structural steels which are subject to welding. It should be noted here that substitution elements other than carbon and silicon are either much more costly than manganese or are more "critical" from a "strategic" standpoint. A considerable decrease in manganese consumption can be effected by suitable revisions of consumer specifications.

And, in (2), specifications set by the producer are in much the same category as those set by the consumer. However, the producer may be able to go somewhat further through a less conservative attitude toward phosphorus in certain products, because phosphorus can replace manganese in its effect on tensile strength within the normal commercial limits on phosphorus and the usual phosphorus contents produced.

In (3), in a large tonnage of steels the manganese content is set to assist in developing the best possible surface qualities in the rolled or finished product. A large saving in manganese can be effected through relaxation of the consumers' requirements on surface combined with extra precautions on the part of the producer to reduce the sulphur content of the steel. Such a procedure will no doubt involve some additional costs, but the amount of manganese to be saved by these two steps is considerable.

And, in (4), open hearth practice can be regulated to conserve standard ferromanganese by:

(A) Increasing the residual manganese by increasing the manganese content of the charge or by lowering the slag volume in the open hearth. Such an increase in residual manganese automatically decreases the ferromanganese requirement, but if the added residual manganese is obtained from manganiferous ores an increase in cost may result.
(B) By careful slag control the maximum possible residual manganese from a given charge and the maximum recovery of added ferromanganese can be assured for a given grade on a high percentage of heats.
(C) Deoxidation of the heat before the manganese addition, as is now practiced in many grades, will increase the manganese efficiency and reduce the requirements of ferromanganese.
(D) The manganese efficiency of a ladle addition is about 10% higher than for a furnace addition. Therefore as much manganese should be added to the ladle as is consistent with the desired quality of the product.
(E) The substitution of manganese alloys lower in manganese than standard ferromanganese is entirely feasible for a considerable amount of ferromanganese, if and when such alloys are available.

These various steps in specifications and practices are capable of markedly decreasing our consumption of ferromanganese without seriously affecting steel quality.

Of great interest also were some interesting comments on the nature of spectroscopic analysis, as well as to what extent can a spectroscope be used for regular testing in a steel plant?

L. Selmi, chief metallurgist, Great Lakes Steel Corp., pointed out that several years ago the physics department of University of Michigan worked out a spectroscopic quantitative analysis for the Wyant, Campbell and Cannon Foundry at Muskegon to control their semisteel casting metal. The Muskegon Plant put in this spectroscopic laboratory and have so far used it to control their manufacturing exclusively with very good results. The time involved in these spectroscopic determinations is much less than the time necessary for the same determinations by the chemical analytical method and this factor has enabled this foundry to have a better and closer control of their product.

After visiting this spectroscopic laboratory, Great Lakes metallurgists became interested. The desire was to determine residual alloys in all steels to find out what effect these residual alloys have in the performance of deep drawing, low carbon steels.

The residual alloys generally found in the low carbon steels are copper, chromium, molybdenum, nickel, tin, aluminum, etc. It is generally assumed that any of these alloys have detrimental effect on the performance of deep drawing steels but no facts to prove this have ever been found in metallurgical literature. The result was a reluctance to blame residual alloys for the poor performance of some of the drawing steels.

To get the information it was necessary to analyze a great number of heats of drawing steels for all these residual alloys and this would have been an enormously taxing and expensive job if it were to be carried out by chemical determination.

Drs. Vincent and Sawyer of the physics department of the University of Michigan were, therefore, consulted on the possibility of determining accurately by spectroscopic methods, these residual alloys in a large number of our steels, and eventually put to use the spectroscope as a routine method of analysis for the residual alloys.

Both Messrs. Vincent and Sawyer advised that the problem could be easily solved with the spectroscope and that by this method, one

Problems

American Iron and Steel Institute invites well known metallurgists to discuss pertinent production problems at annual New York meeting.

man could make a large number of accurate determinations in one day.

On their advice, a spectroscope was installed in the laboratory and with the assistance of the physics department of the University of Michigan, the problem was attacked.

From resultant residual alloy determinations the laboratory has been able so far to establish that tin is a detrimental factor in deep drawing steels. A maximum tin content of 0.02 per cent has been tentatively established in deep drawing steels. Of the other residual alloys no positive statement can be made at this time as to their being detrimental or not in the performance of drawing steel, but in the near future enough data will likely be available to permit an answer to this question.

It is a belief that the spectroscope is a very useful asset in this work and Great Lakes would not think of being without one.

High Blast Temperature

As to what benefits are to be derived from high blast temperatures in blast furnace operation and what factors limit blast temperatures, P. F. Dolan, assistant general manager, Bethlehem Steel Co., had some interesting comments.

It appears that by the use of hot blast, combustion is accelerated, intensified, and consequently confined to a smaller space. The melting zone is concentrated and the hearth assumes a higher temperature. The grade of iron becomes richer and demands more burden to the charge of coke. This reduces the amount of gas per ton of iron and in turn reduces the top temperature, again saving heat and making possible a more economical reduction.

The effect being cumulative, the application of hot blast results in a far greater saving than can be calculated from the addition of heat units in the blast; also a further result is a large increase in production.

The use of high blast heats with the resultant high flame temperatures at the tuyeres of 3510 deg. F. for 1550 deg. F. blast temperature, creates a favorable condition for the diversion of sulphur from the iron with slag of a minimum basicity.

From the foregoing, it was concluded that the use of high blast heats in a steel plant blast furnace enables the operator to furnish the steel department with hot metal in maximum quantity, of suitable physical temperature and chemical analysis, at a minimum cost.

As the blast temperature is raised, the heat from the hot blast becomes a greater proportion of the total heat input, minimizing the effect of coke irregularities and other variables that ordinarily affect the stability of hearth conditions. The resultant reduction in coke required reduces the amount of stone and air per ton of iron; also, as a result, less slag volume and a lowered quantity of sulphur to be eliminated by the slag.

The limiting factors in the use of high blast temperatures appear to be:

(1) The nature of the ore burden which governs the percentage of the direct reduction that can take place.
(2) As the coke consumption per ton of pig is lowered the production of gas decreases. The effect of the lowered volume of gas on furnace top temperatures can limit the use of blast heat.
(3) Quality of coke which limits the amount of ore burden per unit of charge.
(4) The limits of temperature the blast furnace blow pipes will stand.

Domestic Alloying Elements

Another very timely problem was reviewed by W. G. Bischoff, of Timken Roller Bearing Co., that is, to what extent can domestic alloying elements be used to meet essential steel qualities, rather than those that have to be imported.

In order to thoroughly understand just which elements can be classified as domestic or imported, consider the following list of common alloying metals used in the steel industry today and the relative quantity of each we imported.

Manganese, approximately 75 per cent imported.
Silicon approximately 3 per cent imported.
Chromium approximately 90 per cent imported.
Nickel approximately 99+ per cent imported.
Molybdenum—none imported.
Vanadium approximately 50 per cent imported.
Tungsten approximately 55 per cent imported.

Aluminum has not been considered as an alloying metal, mainly because its use in this respect is limited to a few special types of steel.

Of the above mentioned metals, the use of manganese and silicon is imperative in the manufacture of steels, either plain carbon or alloy, made by either open hearth or electric furnace process.

The fact that at the present time 75% of the manganese used in this country is imported, infers that the entire steel industry is dependent upon imported manganese. The true facts, however, are that there are quite large deposits of low grade manganese ore available in this country which can be used at such a time as emergency decrees or the economics of refining justify the working of these deposits.

Chromium is a very common alloying element in steel, having considerable effect on the depth hardening and wear resistant properties of steels; however, certain of these properties can be duplicated to some extent by the use of molybdenum. One exception to the above is the ball bearing analysis for which we have been unable to sub-

stitute at the present time. While practically all chromium is at present imported, there has been located recently a large deposit of low grade ore in this country. This, together with numerous small deposits now being worked, may tend to alleviate the critical situation expected.

It happens that vanadium may soon be classed with molybdenum in that the country is, or soon will be, able to produce domestically enough to satisfy our requirements.

There has been considerable success in substituting molybdenum for tungsten to a certain extent, particularly in high speed tool steels, and this fact, together with an expected increase in the production of tungsten from domestic mines, may not cause undue hardship.

Nickel appears to be one alloying element imparting certain properties to steels for which adequate substitution is somewhat of a problem. The fact that nickel in steel develops a pronounced increase in ductile and impact properties makes our problem of developing a nickel-free steel with comparable properties rather difficult, if not impossible.

There is, therefore, available from reasonably certain domestic sources manganese, silicon, molybdenum, and very probably vanadium from which to develop the required properties of our alloy steels.

Various alloy constructional steels containing molybdenum generally together with some other alloying element are quite common at the present time and there is also considerable indication that steels alloyed by molybdenum alone are finding extensive use for various applications.

Obviously should the country be limited to the use of only those metals found domestically in appreciable quantities, certain sacrifices in physical properties of steels must be expected. However, new developments in combining various ratios of those elements during melting, changes in methods of heat treatment and improvements in the design of finished parts are all products of necessity, particularly in times of emergencies. These expected developments and improvements indicate that in part the new steels will be reasonably satisfactory.

There are many applications where satisfactory substitution of domestic alloys for imported alloys maintaining essentially the same steel qualities, cannot be made. Those steels of exceptionally high alloy content, particularly those containing nickel or chromium, or both, will be impossible to replace. On the other hand, there are many applications where high alloy steels are being used at present when undoubtedly steels of lower and possibly different alloy content would serve equally as well.

Furthermore, the proper segregation of steel scrap, primarily nickel bearing scrap, should the production of nickel steels with a minimum consumption of virgin nickel.

It must also be recognized that general steel quality has shown decided improvement during the past decade and for this reason many of the carbon and low alloy steels of today are nearly the equivalent of the higher alloys of some time past.

It is possible, therefore, to conclude from present information and experience, should it be necessary to rely entirely upon domestic alloying metals, that certain sacrifices in physical characteristics and serviceability of some steels must be expected. But, with a well-engineered research and experimental program, the country can look forward into the immediate future with a certain degree of confidence in the expectation that for the majority of purposes steels alloyed with domestic metals will not cause undue hardship, at least under normal conditions of service.

Bright Copper Increasingly Popular

DUE to the frequent difficulty in obtaining nickel, many concerns are considering going over to heavy copper deposits followed by comparatively light nickel deposits as a means of saving nickel. For this reason, bright heavy copper deposits will be very advantageous at this time.

Following is a brief summary of the salient facts about a bright copper plating process developed by Louis Weisberg, New York, and distributed by Hanson-Van Winkle-Munning Co., Matawan, N. J.:

(1) The basic ingredients of the solution are copper sulphate, diethylene triamine and ammonium sulphate.

(2) The copper is in the bivalent form.

(3) The current efficiency at both anode and cathode is practically 100 per cent.

(4) The throwing power compares favorably with a cyanide copper solution and is said to be much better than an acid copper solution.

(5) The average current density is about 40 amp. per sq. ft. for optimum brightness.

(6) The bright plating range extends from practically zero on the one hand up to over 100 amp. per sq. ft. on certain simple types of work.

(7) A moving cathode is recommended.

(8) Anodes are preferably of electrolytic copper (cathode) although cast copper anodes may be and have been used.

(9) Operating temperature is approximately 140 deg. F.

(10) Rubber lined equipment—tank and filter are required.

(11) Regular filtration is necessary to keep the solution clean.

(12) Heating can be provided by means of a copper coil or a Duriron heat exchanger.

(13) A cyanide copper flash before plating on zinc or steel is required. This need not be more than a two- or three-minute flash, except possibly on pieces carrying heavy scale such as bumpers, where about 0.0001 in. of cyanide copper is recommended. Either a Rochelle salt solution or an ordinary cyanide copper solution may be used for the flashing.

1500 TOOL STEELS

THIS is a continuation from last week of the indexing of approximately 1500 tool, metal cutting and die steels, and sintered carbides. In some instances the same steel is shown under several variations of the same name, in conformity with shop practice; the same steel is on occasion listed under a manufacturer's name and under a distributer's name; occasionally steels no longer made are indexed for the sake of full coverage; and, of course, some imported steels indexed are for the time being unobtainable. Thus, this indexing of all known tool steels should have maximum application in enabling users to locate and ascertain the properties of any steel produced in this country. This indexing of steels will be continued in successive issues of THE IRON AGE until completed.

Extra
A water hardening steel, for beading tools, stone tools, collets, wood tools, cold header expander pins, lathe (live) centers taps and reamers. Contains C 1.10 to 1.20, Mn 0.30, V 0.50, Si 0.35. Agawam Tool Co., West Springfield, Mass.

Extra
Carbon steel, for general purposes, containing C 0.60-1.40, Mn 0.20-0.35, Si 0.10-0.25. Braeburn Alloy Steel Corp., Braeburn, Pa.

Extra Carbon
Water hardening tool steel, for engraving tools, shear blades, taps, reamers. Contains C 1.00, Mn 0.25, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Extra Chrome
A special alloy hot work steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

Extra No. 5
A plain carbon steel. Peter A. Frasse & Co., Inc., New York.

Extra G
A plain carbon steel. D. G. Gautier & Co., New York.

Extra Grade Carbon
A water hardening steel. Contains C 0.60 to 1.20. Midvale Co., Nicetown, Philadelphia, Pa.

Extra M. G.
A non-deforming steel, containing Mn. Houghton & Richards, Inc., Boston.

Extra Punch
A special alloy steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

Extra Quality
A plain carbon steel. Houghton & Richards, Inc., Boston.

Extra Special
A high speed steel. Bethlehem Steel Co., Bethlehem, Pa.

Extra Special
A plain carbon steel. Halcomb Steel Co., Syracuse, N. Y.

Extra Special Alloy
A special alloy steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

Extra Tool
A plain carbon steel. John A. Crowley Co., New York.

Extra Tough No. 4
A special alloy steel. Jessop Steel Co., Washington, Pa.

Extra Vanadium
Carbon-vanadium, water hardening steel for punches and severe shock tools. Is tough steel with excellent fatigue resistance. Available in several carbon ranges. Contains Mn 0.25, V 0.20, Si 0.20. Columbia Tool Steel Co., Chicago Heights, Ill.

Extra Warranted
A plain carbon steel. Halcomb Steel Co., Syracuse, N. Y.

Extrude Die
A special alloy hot work steel, containing W, Cr, V and Ni. Vanadium-Alloys Steel Co., Latrobe, Pa.

Extrusion Die
A special alloy steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

EZH Extra Best
A plain carbon steel. Poldi Steel Works, New York.

EZH Special
A plain carbon stetel. Poldi Steel Works, New York.

E Z 14 W Hot Die
A high speed steel, containing Cr and W. Boyd-Wagner Co., Chicago.

F

Fagersta A D 95 Coining Die
Tool steel. Contains C 0.70, Cr 0.25, V 0.15, W 1.00. Swedish Steel Mills', A.A., New York.

Fagersta Alloy Chisel
Tool steel. Contains C 0.45, Cr 0.90, Mn 0.25, W 1.00, Mo 0.20, Si 0.20. Swedish Steel Mills', A.A., New York.

Fagersta Alloy Shoe Die
Tool steel. Contains C 0.50, Cr 0.60, Mn 0.60, Mo 0.40. Swedish Steel Mills', A.A., New York.

Fagersta Alloy "30" Drill
Tool steel. Contains C 1.00, Cr 1.10, Mn 0.30, Mo 0.35, Si 0.30. Swedish Steel Mills', A.A., New York.

Fagersta Brilliant A X
Tool steel. Contains C 0.70, Cr 4.00, V 0.75, W 18.00. Swedish Steel Mills', A.A., New York.

Fagersta Brilliant H H
Tool steel. Contains C 0.70, Cr 3.50, W 14.00. Swedish Steel Mills', A.A., New York.

Fagersta Brilliant W K E
Tool steel. Contains C 0.70, Cr 4.50, Co 5.00 V 1.50, W 18.00, Mo 1.00. Swedish Steel Mills', A.A., New York.

Fagersta Brilliant W K E Extra
Tool steel. Contains C 0.70, Cr 4.50, Co 9.00, V 1.50, W 19.00, Mo 1.00. Swedish Steel Mills', A.A., New York.

Fagersta Brilliant W W
Tool steel. Contains C 0.70, Cr 4.50, V 1.50, W 18.00. Swedish Steel Mills', A.A., New York.

Fagersta Broach
Tool steel. Contains C 1.15, Cr 0.40, Mn 0.40, 1.25, Si 0.25. Swedish Steel Mills', A.A., New York.

Fagersta Cold Heading
Tool steel. Contains C 1.05, Mn 0.35, V 0.50, Si 0.20. Swedish Steel Mills', A.A., New York.

Fagersta Cutlery
Tool steel. Contains C 1.10, Mn 0.20, Si 0.25. Swedish Steel Mills', A.A., New York.

Fagersta Die Casting
Tool steel. Contains C 0.50, Cr 3.00, Mn 0.35, V 0.25, Si 0.20. Swedish Steel Mills', A.A., New York.

Fagersta Engraver Plates
Tool steel. Contains C 0.35, Mn 0.30, Si 0.10. Swedish Steel Mills', A.A., New York.

Fagersta Envelope Die
Tool steel. Contains C 0.90, Mn 0.35, Si 0.15. Swedish Steel Mills', A.A., New York.

Fagersta Extra
Tool steel. Contains C 1.00, Mn 0.35, Si 0.15. Swedish Steel Mills', A.A., New York.

Fagersta Fast Finishing
Tool steel. Contains C 1.35, Cr 0.60, Mn 0.35, W 3.25, Si 0.35. Swedish Steel Mills', A.A., New York.

Fagersta High Production
Tool steel. Contains C 1.60, Cr 12.00, Mn 0.30, V 0.20, Mo 0.80, Si 0.30. Swedish Steel Mills', A.A., New York.

Fagersta Hollow Drill
Tool steel. Contains C 0.80, Mn 0.30, Si 0.10. Swedish Steel Mills', A.A., New York.

Fagersta Hot Die
Tool steel. Contains C 0.30, Cr 3.50, Mn 0.30, V 0.40, W 9.00, Si 0.45. Swedish Steel Mills', A.A., New York.

Fagersta Non-Deforming
Tool steel. Contains C 0.95, Cr 0.45, Mn 1.05, W 0.45. Swedish Steel Mills', A.A., New York.

Fagersta Overcoat Axe
Tool steel. Contains C 1.00, Mn 0.25, Si 0.15. Swedish Steel Mills', A.A., New York.

Fagersta Pavement Breaker
Tool steel. Contains C 0.65, Mn 0.30, Si 0.10. Swedish Steel Mills', A.A., New York.

Fagersta Polhem Wire Drawing
Tool steel. Contains C 1.80, Cr 2.00, Mn 2.00, W 13.00. Swedish Steel Mills', A.A., New York.

Fagersta Regular
Tool steel. Contains C 1.00, Mn 0.35, Si 0.15. Swedish Steel Mills', A.A., New York.

Fagersta Rolled Auger
Tool steel. Contains C 0.85, Mn 0.30, Si 0.10. Swedish Steel Mills', A.A., New York.

Fagersta Shoe Die
Tool steel. Contains C 0.90, Mn 0.35, Si 0.15. Swedish Steel Mills', A.A., New York.

Fagersta Solid Drill
Tool steel. Contains C 0.85, Mn 0.30, Si 0.10. Swedish Steel Mills', A.A., New York.

Fagersta Special
Tool steel. Contains C 1.00, Mn 0.35, Si 0.15. Swedish Steel Mills', A.A., New York.

Falcon
A special alloy steel, containing Cr and W. Canadian Atlas Steels, Ltd., Welland, Ont., Canada.

Fast Finishing
A special alloy steel. Hobson, Houghton & Co., Inc., New York.

F. C. C. No. 1
An oil hardening steel, used for die blocks. Contains C 0.45 to 0.55, Cr 0.60 to 0.75, Mn 0.50 to 0.60, Si 0.10 to 0.20, Ni 1.50 to 1.75. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 2
An oil hardening steel, used for upset inserts. Contains C 0.18 to 0.23, Cr 1.40 to 1.60, Mn 0.40 to 0.60, Si 0.15 to 0.25, Mo 0.45 to 0.55, Co 1.00 to 1.25. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 4
A tungsten water steel, used for fast finishing. Contains C 0.90 to 1.00, Mn 0.20 to 0.30, Si 0.15 to 0.25, W 0.75 to 0.85. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 5
A high carbon chromium oil hardening steel, used for draw dies, cut edges. Contains C 1.90 to 2.20, Cr 11.50 to 12.50, Mn 0.20 to 0.35, Si 0.20 to 0.30, Mo 0.60 to 0.90. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 6
A chrome carbon steel, used for zinc die casting. Contains C 0.30 to 0.40, Cr 0.90 to 1.10, Mn 0.65 to 0.80, Si 0.20 to 0.30, V 0.15 to 0.25. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 7
An oil hardening steel, used for aluminum die casting. Contains C 0.37 to 0.42, Cr 4.50 to 5.50, Mn 0.30 to 0.40, Si 0.75 to 0.85, Mo 0.40 to 0.55. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 10
An oil hardening steel, used for cold roll dies. Contains C 1.00 to 1.20, Cr 1.10 to 1.30, Mn 0.30 to 0.40, Si 0.20 to 0.30, Mo 0.30 to 0.40. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 11
An oil hardening steel, used for gears. Contains C 0.40 to 0.50, Cr 1.45 to 1.50, Mn 0.60 to 0.70, Si 0.20 to 0.30, Ni 3.50 to 3.55. Forgings & Casting Corp., Ferndale, Mich.

F. C. C. No. 14
An oil or air hardening steel, used for hot work dies. Contains C 0.30 to 0.40, Cr 3.50 to 4.25, Mn 0.20 to 0.35,, Si 0.15 to 0.25, W 9.00 to 10.50, V 0.20 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 19
An oil hardening steel, used for hot work dies for aluminum. Contains C 0.30 to 0.40, Cr 4.00 to 5.50, Mn 0.25 to 0.40, Si 0.80 to 1.75, W 3.75 to 4.25, V 0.20 to 0.35. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 20
A water hardening steel, used for cold draw dies. Contains C 1.30 to 1.40, Mn 0.25 to 0.35, Si 0.50 to 0.65, W 3.25 to 3.60, V 0.20. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 21
An oil hardening steel, used for aluminum blanking. Contains C 0.45 to 0.50, Cr 1.30 to 1.50, Mn 0.20 to 0.30, Si 0.80 to 1.00, W 1.50 to 2.25, V 0.15 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 22
An oil hardening steel, used for punches, shears. Contains C 0.45 to 0.50, Cr 1.00 to 1.50, Mn 0.20 to 0.35, Si 0.20 to 0.35, W 2.50 to 3.25, V 0.15 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 23
An oil hardening steel, used for extrusion liners. Contains C 0.35 to 0.42, Cr 1.00 to 1.50, Mn 0.40 to 0.80, Si 0.60 to 1.10, W 3.75 to 4.25, V 0.15 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 25
A tungsten die casting steel, used for brass die casting. Contains C 0.30 to 0.35, Cr 3.75 to 4.25, Mn 0.15 to 0.30, Si 0.20 to 0.35, Mo 1.75 to 2.25, W 13.00 to 15.00, Ni 2.50 to 3.00. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 26
An oil hardening steel, used for hot work applications. Contains C 0.35 to 0.42, Cr 1.00 to 1.50, Mn 0.40 to 0.80, Si 0.60 to 1.10, Mo 0.45 to 0.55, W 2.50 to 3.00, V 0.15 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 27
An oil hardening steel. Contains C 0.35 to 0.45, Cr 2.75 to 3.25, Mn 0.20 to 0.35, Si 1.75 to 2.00, Mo 2.75 to 3.00, W 5.00 to 5.50, V 0.50 to 0.60, Co 1.00 to 1.50. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 34M
A water hardening steel, used for general purposes. Contains C 0.95 to 1.05, Mn 0.25 to 0.35, Si 0.15 to 0.20. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 38 M
A carbon vanadium steel, used for special purposes. Contains C 0.90 to 1.00, Mn 0.15 to 0.30, Si 0.15 to 0.25, V 0.15 to 0.25. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 39
A chromium water hardening steel, used for draw rings. Contains C 0.85 to 0.95, Cr 0.40 to 0.60, Mn 0.20 to 0.35, Si 0.15 to 0.30, V 0.15 to 0.20. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 41 M
A regular high speed steel, used for cutters and hobs. Contains C 0.65 to 0.75, Cr 3.50 to 4.50, Mn 0.20 to 0.30, Si 0.20 to 0.30, W 17.00 to 18.50, V 1.00 to 1.35. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 44 (HIA)
An oil hardening steel, used for brass forging. Contains C 0.44 to 0.48, Cr 4.75 to 5.50, Mn 0.25 to 0.35, Si 1.50 to 1.75, Mo 5.00 to 6.00, V 0.15 to 0.25, Ni 1.40 to 1.60. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 46 M
An oil hardening steel, used for punches and dies. Contains C 0.90 to 1.00, Cr 0.40 to 0.60, Mn 1.00 to 1.25, Si 0.20 to 0.30, W 0.40 to 0.60, V 0.20 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 47 M
An oil hardening steel, used for fast finishing. Contains C 1.15 to 1.25, Cr 0.40 to 0.50, Mn 0.20 to 0.30, W 1.50 to 1.75, V 0.15 to 0.25. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 48 M
An air hardening steel, used for cut edges and forming. Contains C 1.45 to 1.60, Cr 11.50 to 12.50, Mn 0.40 to 0.50, Si 0.35 to 0.45, Mo 0.70 to 0.90, V 0.15 to 0.25, Co 0.70 to 0.80. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 49
A hot working piercing steel. Contains C 0.30 to 0.45, Cr 0.75 to 1.00, Mn 0.35 to 0.45, Si 0.10 to 0.30, W 5.25 to 6.25, Ni 3.50 to 4.25. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 53
A tungsten oil hardening steel, used for hot draw dies. Contains C 0.50 to 0.55, Cr 3.50 to 4.50, Mn 0.15 to 0.35, Si 0.20 to 0.30, W 17.00 to 19.00, V 0.75 to 1.25. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 66
An air hardening steel, used for cut edges and forming. Contains C 1.45 to 1.60, Cr 11.50 to 13.00, Mn 0.30 to 0.50, Si 0.25 to 0.45, Mo 0.85 to 1.00, V 0.40 to 0.60, Co 3.00 to 3.50, Ni 0.30 to 0.45. Forging & Casting Corp., Ferndale, Mich.

F. C. C. 5X1
An oil hardening steel, used for mandrels. Contains C 0.30 to 0.35, Cr 4.75 to 5.00, Mn 0.30 to 0.40, Si 1.15 to 1.25, Mo 1.50 to 1.60, V 0.40 to 0.50. Forging & Casting Corp., Ferndale, Mich.

F. C. C. Air Hardening Cast-to-Shape
An air hardening steel, used for edge cutting and forming. Contains C 1.45 to 1.60, Cr 11.50 to 12.50, Mn 0.40 to 0.50, Si 0.35 to 0.45, Mo 0.90 to

1.00, V 0.50 to 0.60, Co 0.60 to 0.70, Ni 0.20 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. C. M. S. Cast-to-Shape
An oil and air hardening steel, used for forming. Contains C 0.55 to 0.65, Cr 0.80 to 1.20, Mn 0.60 to 0.80, Si 0.30 to 0.40, Mo 0.35 to 0.45, Ni 0.40 to 0.50. Forging & Casting Corp., Ferndale, Mich.

F. C. C. Oil Hardening Cast-to-Shape
An oil hardening steel, used for forming. Contains C 0.85 to 0.95, Cr 0.40 to 0.60, Mn 1.00 to 1.25, Si 0.20 to 0.30, W 0.40 to 0.60, V 0.20 to 0.30. Forging & Casting Corp., Ferndale, Mich.

F. C. C. T. M. S. Cast-to-Shape
An oil hardening steel, used for forming. Contains C .45 to 0.55, Cr 1.40 to 1.70, Mn 0.45 to 0.60, Si 0.40 to 0.60, Ni 2.50 to 3.00. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 55 Cast-to-Shape
An air hardening steel, used for cut edges and forming. Contains C 1.45 to 1.60, Cr 11.50 to 13.00, Mn 0.30 to 0.50, Si 0.25 to 0.45, Mo 0.85 to 1.00, V 0.40 to 0.60, Co 1.75 to 2.25, Ni 0.30 to 0.45. Forging & Casting Corp., Ferndale, Mich.

F. C. C. No. 66 Cast-to-Shape
An air hardening steel, used for cut edges and forming. Contains C 1.45 to 1.60, Cr 11.50 to 13.00, Mn 0.30 to 0.50, Si 0.25 to 0.45, Mo 0.85 to 1.00, V 0.40 to 0.60, Co 3.00 to 3.50, Ni 0.30 to 0.45. Forging & Casting Corp., Ferndale, Mich.

Fedol Oil Hardening
A special alloy steel, containing Mn. Swedish Iron & Steel Corp., New York.

Ferno
Oil or air hardening steel for hot work, dies, punches, shear blades, etc. Has good red hardness and very high compression strength. Contains C 0.70, Cr 3.75, V 0.55, Mo 0.70, Si 0.25. Lehigh Steel Co., New York.

Ferno Extra
Oil or air hardening steel for hot work, hot dies, punches shear blades, etc. Has very high red hardness and toughness, resists abrasion, and has high compression strength. Contains C 0.45, Cr 3.75, Mn 0.40, V 0.70, W 12.00, Si 0.30. Lehigh Steel Co., New York.

No. 57 Hotwork
A heat resistant, hot work steel for hot dies, dummy blocks, etc. containing C 0.40, Cr 2.75, Mn 0.30, V 0.50, W 9.00, Si 0.30. Bethlehem Steel Co., Bethlehem, Pa.

Finishing
A special alloy steel. Bethlehem Steel Co., Bethlehem, Pa.

Finishing Special
A special alloy steel, containing Cr and W. Midvale Co., Philadelphia.

Firedie
Chromium steel for hot work applications and die casting dies for aluminum base alloys. Resists abrasion at elevated temperatures. Contains C 0.35, Cr 5.00, Mn 0.45, V 0.45, Mo 1.00, Si 1.00. Columbia Tool Steel Co., Chicago Heights, Ill.

Firex-Special
Air or oil-hardening steel, for tools resisting shock. Has extreme toughness. Contains C 0.40-0.55, Cr 0.40-1.00, Ni 2.75-4.00, Mn 0.40-0.90, V 0.15-0.20, Mo 0 45-0.75, Si 0.25-0.90. Darwin & Milner, Inc., Cleveland.

First Quality
A plain carbon steel. Houghton & Richards, Inc., Boston.

Firth Best Tool
Water hardening, general purpose steel, for drills, small tools and dies, containing carbon as required, Cr 0.10, Mn 0.28, Si 0.25. Firth-Sterling Steel Co., McKeesport, Pa.

Firth Extra Tool
Water hardening steel, for drills, small tools and dies, containing Carbon as required, Cr 0.10, Mn 0.28, Si 0.25. Firth-Sterling Steel Co., McKeesport, Pa.

Firthaloy
Special grade of tungsten and other carbides for wire drawing dies. Firth-Sterling Steel Co., McKeesport, Pa.

Firthite
A mixture of tungsten and other carbides for cutting tools made in many grades. Firth-Sterling Steel Co., McKeesport, Pa.

5 Best
A plain carbon steel. Poldi Steel Works, New York.

No. 548
A special alloy steel. Carboloy Co., Inc., Detroit.

No. 5 Hot Work
A tungsten hot work steel. Edgar Allen Steel Co., New York.

No. 57
A tungsten hot work steel. Bethlehem Steel Co., Bethlehem, Pa.

No. 5-720 Chrome-Vanadium
Hot work steel for hot piercing mandrels, etc. Has toughness, red hardness, fatigue resistance. Contains C 0.55, Cr 1.00, Mn 0.75, V 0.20, Si 0.30. Carpenter Steel Co., Reading, Pa.

Five Star
A high speed tool steel. Contains C 0.85, Cr 4.0, Co 10.5, W 18.0, Mo. 0.55. Midvale Co., Nicetown, Philadelphia.

FM
A special alloy steel, containing Cr and Mo. A. Finkl & Sons Co., Chicago.

FNS
A non-deforming steel, containing Cr. Canadian Atlas Steels, Ltd., Welland, Ont., Canada.

Formite
Tungsten hot work steel for hot forming and blanking dies, nut piercers, hot punches, compression dies. High wear resistance at elevated temperatures. Contains C 0.40, Cr 3.75, Mn 0.35, V 0.65, W 14.00, Si 0.35. Columbia Tool Steel Co., Chicago Heights, Ill.

Fort Pitt
A regular carbon steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

4 Best
A plain carbon steel. Poldi Steel Works, New York.

48 Alloy
Water-hardening steel, for chisels, shear blades, punches, pneumatic tools, etc. Contains C 0.55, Cr 0.20, Mn 0.75, V 0.20, Si 2.00. Hidalgo Steel Co., New York.

No. 484
Air-hardening tool steel for general tool room use. Has hardness, toughness and is non-deforming. Contains C 0.95, Cr 5.00, Mn 0.70, V 0.20, Mo 1.00, Si 0.20. Carpenter Steel Co., Reading, Pa.

No. 4870
A shock resisting chisel and punch steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

No. 445
A chrome hot work die steel. Bethlehem Steel Co., Bethlehem, Pa.

4-HW
A special alloy steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

No. 4 Hot Work
A chrome hot work die steel. Edgar Allen Steel Co., New York.

Four Star
A tungsten cobalt type high speed steel. Midvale Co., Philadelphia.

426
A special alloy steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

FPC Chisel Steel
A non-tempering chisel steel, for chisels, caulking tools, cold cutters, stone tools, drift pins, etc. Contains C 0.30 to 0.40, Cr 0.70 to 0.90, Mn 0.60 to 0.80, Mo 0.30 to 0.60. A. Milne & Co., New York.

Frasse Grade A
Water hardening steel, for augers, broaches, cutters, forming tools, etc. Containing C 1.10-1.20, Mn 0.15-0.25, Si 0.15-0.25. Peter A. Frasse & Co., New York.

Frasse Grade B
Water hardening steel, for cold chisels, drills, knives, punches, reamers, shear blades, taps, etc. Contains C 1.00-1.10, Mn 0.15-0.25, Si 0.15-0.25. Peter A. Frasse & Co., New York.

Frasse Grade C
Water hardening steel, for chisels, drills, hammers, picks, punches, quarry tools, etc. Contains C 0.90-1.00, Mn 0.15-0.25, Si 0.15-0.25. Peter A. Frasse & Co., New York.

Frasse Grade H
Steel for hard cutting tools. Containing C 1.00-1.10, Mn 0.25 max., W 1.25-1.75, Si 0.15-0.25. Peter A. Frasse & Co., New York.

FS
A special alloy steel, containing Cr, Ni and Mo. A. Finkl & Sons Co., Chicago.

F. S. Extra Best
A plain carbon steel. Poldi Steel Works, New York.

FX
A special alloy steel, containing Cr, Ni and Mo. A. Finkl & Sons Co., Chicago.

G

Gibraltar
A plain carbon steel. H. Boker & Co. Inc., New York.

Gold Anchor
Drill rods (red cut superior high speed steel), for twist drills, dies, punches, reamers, taps, rotary files, wood router bits, cutters and miscellaneous small tools. Contains C 0.69 to 0.74, Cr 3.75 to 4.25, Mn 0.10 to 0.30, V 0.95 to 1.15, W 17.50 to 18.50, Si 0.25 to 0.40, P. 0.03 max. S. 0.03 max. Anchor Drawn Steel Co., Latrobe, Pa.

Gold Label
High speed steel for metal cutting tools. Discontinued. Contains C 0.65 to 0.75, Cr 3.00 to 4.00, Mn 0.25 to 0.35, Co 2.00 to 3.00, V 1.00 to 1.50, W 18.00 to 20.00, Si 0.25 to 0.40. Heller Brothers Co., Newark.

Gold Star
Cobalt high speed tool steel for super high speed cutting. Has red-hard cutting qualities. Contains C 0.77, Cr 3.75, Mn 0.25, Co 5.00, V 2.00, W 13.50, Si 0.30. Carpenter Steel Co., Reading, Pa.

Gordon
Water or oil hardening die steel, for arbors, blacksmith tools, cold cutters, cold heading dies, nail dies, pneumatic tools, swedging dies. Has high toughness and low deformation. Contains C 0.60, Cr 0.60, Mn 0.30, Mo 0.35, Si 0.70. Latrobe Electric Steel Co., Latrobe, Pa.

Grade A
A plain carbon steel of Swedish iron base. Contains C 1.00, Mn 0.30. Diehl Steel Co., Cincinnati.

Grade H
A special alloy steel, containing W. Peter A. Frasse & Co., Inc., New York.

Gralur
A plain carbon steel. Duke Steel Co. Inc., New York.

Granada
Carbon tool steel, for general tool and die work. Contains C 1.00. Crucible Steel Co. of America, New York.

Graph-Al
Water hardening steel, for tube drawing mandrels, cold heading dies, and impact applications. Good resistant to abrasion. Excellent machining and impact properties. Contains C 1.50, Mn 0.40 max., Si 0.15 to 0.25. Timken Steel & Tube Co., Canton, Ohio.

Graph M.N.S.
Air hardening steel, for intricate dies, light section parts for cold metal forming, hot working dies and tools. Non-deforming and good resistance to abrasion. Contains C 1.50, Cr 0.35, Ni 1.75, Mn 1.25, Mo 0.50, Si 1.25. Timken Steel & Tube Co., Canton, Ohio.

Graph-Mo
Non-deforming oil hardening steel, for tools, dies, oil seals, wear plates, spindles, gages, etc. Good resistance to abrasion and excellent machining properties. Contains C 1.50, Mn 0.40 max., Mo 0.25 to 0.30, Si 0.75 to 0.85. Timken Steel & Tube Co., Canton, Ohio.

Graph-Sil
Water hardening steel, for tools, dies, brake drums, cylinder liners, pump tubing, bushings, etc. Good response to heat treatment and high fatigue resistance. Contains C 1.50, Mn 0.40 max., Si 0.85 to 0.95. Timken Steel & Tube Co., Canton, Ohio.

Graph-Tung
Water hardening steel, for bar and tube cold drawing dies, deep drawing dies, bushings, general purpose dies and tools, air hammer pistons. Excellent resistance to abrasion and good impact properties. Contains C 1.50, Mn 0.40 max., W 2.60 to 3.00, Mo 0.50, Si 0.65 to 0.75. Timken Steel & Tube Co., Canton, Ohio.

Gray Cut Cobalt
A high speed steel, containing W, Cr, V and Co. Vanadium-Alloys Steel Co., Latrobe, Pa.

Gray Label
Non-deforming and tough steel for hobs, taps, reamers and dies. Contains C 0.80 to 0.90, Mn 1.20 to 1.40, W 0.30 to 0.50, Si 0.15 to 0.30. Heller Brothers & Co., Newark.

Gray Label
A water hardening steel, for cold header dies. Contains C 0.95, Mn 0.30. Peninsular Steel Co., Detroit.

Green Label
Hard and tough water hardening steel for tools and dies. Contains C 0.80 to 1.10, Mn 0.40 max., Si 0.10 to 0.20. Heller Brothers Co., Newark.

Green Label
An inexpensive tool steel for general blacksmithing and tool forge purposes. Contains C 0.70 to 0.80. A. Milne & Co., New York.

Green Label
A regular carbon tool steel. Simonds Saw & Steel Co., Fitchburg, Mass.

Green Label
A shock resisting, oil hardening steel, for gears, pressure parts, crank shafts. Contains C 0.50, Cr 1.00, Mn 0.75, V 0.18, Si 0.20. Peninsular Steel Co., Detroit.

Green Label Drill Rod
Tool steel drill rod for general tool room use. Has hardness, wear-resistance and is tough. Contains C 1.20, Mn 0.20, Si 0.20. Carpenter Steel Co., Reading, Pa.

Gripmore Tool
Hot work steel. Contains C 0.95, Cr 3.50, W 1.00. Bissett Steel Co., Cleveland.

G. S. N.
Air or oil hardening die steel, for beading rolls, forming rolls, blanking and forming dies, gages. Has extremely high abrasive resistance. Contains C 2.15, Cr 13.00, Ni 0.50, Mn 0.50, Si 0.40. Latrobe Electric Steel Co., Latrobe, Pa.

G. S. N. Special
Air or oil hardening die steel, for punches, shear blades, etc. Has extremely high abrasive resistance. Contains C 1.50, Cr 11.50, Mn 0.30, V 0.30, Mo 0.75, Si 0.30. Latrobe Electric Steel Co., Latrobe, Pa.

H

H
Non-deforming oil-hardening steel, for dies and press tools. Is tough and has resistance to abrasion. Contains C 1.00, Cr 0.40, Mn 1.00, Si 0.30. Darwin & Milner, Inc., Cleveland.

H & R Cobalt
A cobalt high speed steel, used for lathes, planer and boring mill tools. Contains C 0.75 to 0.80, Cr 4.00, Co 5.00, V 1.00, W 18.00. Houghton & Richards, Inc., Boston.

H & R No. 80
An air hardening steel, for lamination dies for short runs, gages, reamers, blanking, trimming dies, shear blades, master tools, etc. Contains C 0.95 to 1.05, Cr 5.00 to 5.50, Mn 0.50 to 0.80, V 0.20 to 0.30, Mo 0.95 to 1.25, Si 0.10 to 0.30. Houghton & Richards, Inc., Boston.

H & R Grey Label
A water hardening steel, particularly adapted to classes of work where a hard and tough condition of a tool is required to resist wear and shock. Contains C 0.90 to 1.05, Mn 0.20 to 0.30, Si 0.15 to 0.25. Houghton & Richards, Inc., Boston.

H & R Hot Work
A hot work steel, particularly adapted to such forms of hot work as dummy blocks, dies for extrusion work in brass and copper, hot forming dies, hot heading tools and swedging dies, shear blades and cut-offs for hot material. Contains C 0.30 to 0.35, Cr 3.00 to 3.50, V 0.30 to 0.50, W 10.00 to 11.50, Si 0.20 to 0.35. Houghton & Richards, Inc., Boston.

H & R K
A high carbon, high chromium steel, for plug gages, blanking and lamination dies, punches, cold trimming, and forming dies. Contains C 2.25 to 2.40, Cr 12.75 to 13.25, Mn 0.25 to 0.40, V 0.15 to 0.25, Si 0.15 to 0.30. Houghton & Richards, Inc., Boston.

H & R K 2
A high carbon, high chromium steel, recommended for blanking and forming dies, thread rolling dies, lamination dies, plug gages, lahte centers and any parts subject to wear. Contains C 1.50, Cr 11.50, Mn 0.25, V 0.25, Mo 0.75, Si 0.30. Houghton & Richards, Inc., Boston.

H & R MY-A
An oil hardening chisel steel, for both hot and cold work, rivet sets and busters, pneumatic chisels, hand chisels, punches, beading tools, screw drivers, shear blades, etc., and particularly adapted for hobs for plastic mold work. Contains C 0.40 to 0.45, Cr 1.40 to 1.50, Mn 0.30, V 0.20 to 0.30, Si 1.40 to 1.50. Houghton & Richards, Inc., Boston.

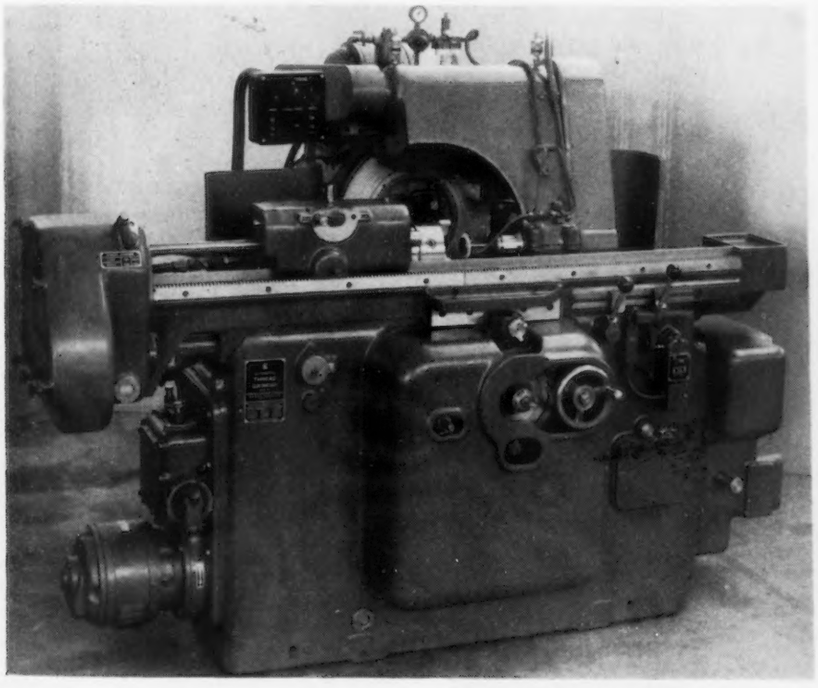
(TO BE CONTINUED NEXT WEEK)

New Equipment . . .

Machine Tools

Advances in design featured in this review comprise internal thread and a variety of other grinders, horizontal boring and broaching machines, shell turning lathe, heavy duty lathes, vertical millers, plate planers and a tube bending machine.

A SERIES of fully automatic internal thread grinding machines has been added to the line of *Jones & Lamson Co.*, Springfield, Vt. On these new machines the grinding wheel spindle is automatically withdrawn by an air cylinder from the grinding to the wheel dressing position. The wheel is dressed automatically and the grinding wheel spindle returned to the working position, all within two seconds. The amount dressed off the wheel is compensated for, and the machine feeds in successively until size is reached. Then the spindle is removed to the dressing position and the machine stops. The tool is equipped with a d.c. motor with rheostat control, giving a full range of grinding speeds. There is ample clearance for gaging and changing of work and a safety device locks the grinding wheel to prevent accidents. The machine comes in three sizes: for threads up to 6-in. diameter and 3-in. length, for 6½-in. diameter and 5-in. length, and 14-in. diameter and 5-in. length. Thread pitches can be made from 2 to 48 inclusive and right or left hand, single, double, triple, quadruple or sextuple lead. A ground master lead screw and pitch change gears are furnished as standard equipment.



Surface Grinder

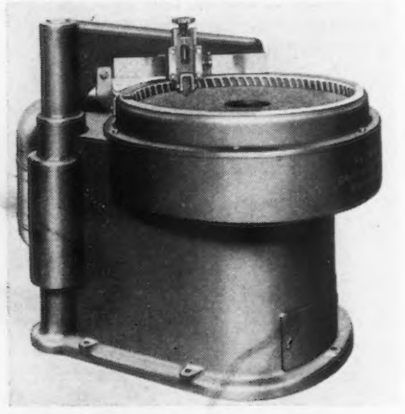
ILLUSTRATED is the new Doall precision surface grinder which will grind flat to 4 micro-in. r.m.s. Precision ball bearings, carried in

a ground heat treated forged SAE 3140 quill, are the heart of the spindle head. Other features include: built-in flush type lighting, indicator with direct measurements between wheel and work in "tenths," an adjustable dust or splash guard which can be set close to the work and adjusted as the wheel wears. The wheel guard rotates and can be locked in any position when using a tangent-to-radius wheel dresser. The handwheel is graduated in half-thousandths, has an auxiliary vernier adjustment for feeding in tenths

and is protected against rust by a dull chrome finish. The table capacity is 9 x 18 in. and can be used for dry or wet grinding. Absolute control is maintained in the vertical feed of 0.001 and 0.0001 in., the hydraulic traverse feed of 0-50 ft. per min. and also infinite cross movement of 0 to 0.125. Made by *Continental Machines, Inc.*, 1301 Washington Avenue South, Minneapolis.

Horizontal Disk Grinder

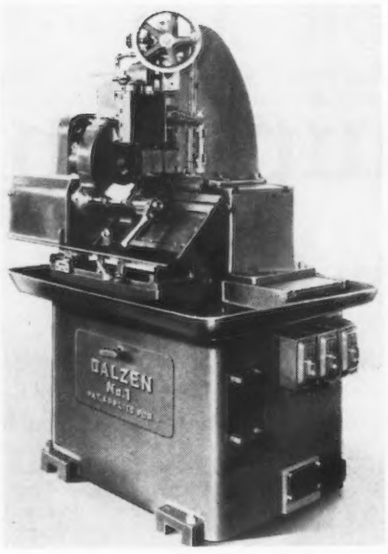
LIKE other types of 30-in. horizontal disk grinders produced by *Gardner Machine Co.*, Beloit, Wis., the No. 186 machine is adapted to produce a flat surface that does not have to bear a definite relation to other portions of the casting. This machine is equipped with belt drive and standard motor. A



removable louver-type guard ring aids materially in cleaning. A swinging bar type dresser provides rigidity and speed in dressing. The wheel to be dressed and flattened is placed upon a 30-in. steel wheel which rotates in a horizontal plane and which is driven by a motor of 5 to 15 hp. capacity. For wet grinding a welded steel outside settling tank is supplied. The swinging bar type dresser pivots from a rigid support, and the arm is swung into the center position and locked by two clamping screws. The 3¼-in. spindle is mounted on ball bearings. This machine can also be supplied in 36-in. size.

Thread Grinder

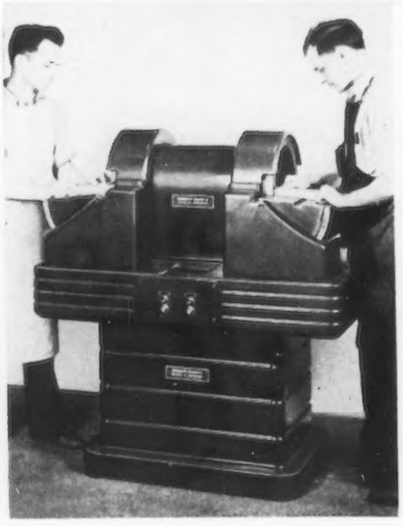
VERTICAL thread grinder was developed by the *Dalzen Tool & Mfg. Co.*, Detroit. The work is approached in this machine from above. In this position the head is directly above its own base and a



constant equilibrium is maintained. The weight is always down on the feed screw and the size of work is insured. This grinder has a capacity of 18 in. between centers, 6 in. in diameter and can produce 10-in. threads anywhere on the 18-in. shaft. The head pivots and can be set accurately to a maximum of 25 deg. either side of center to produce right or left hand threads of standard or special form. A master cam with an adjustable fulcrum block and pick-off gears produces variable reliefs on any number of flutes in taps. The machine occupies 38 x 48 in. floor space.

Carbide Tool Grinder

LARGER carbide tool grinder of the double end type has been announced by *Carboloy Co., Inc.*, Detroit. The grinder uses two 14-in. disk type wheels and may be used



for rough and finish grinding. Individually adjustable tool rest tables measure 9 x 22 in. and can be locked into position. Wheel guards move with the table brackets. Suction spouts are provided for connection to individual or centralized suction systems. The 2-hp. fan cooled, ball-bearing motor is mounted in the base and is fully enclosed. Drive belt adjustment to the 1350 r.p.m. spindle is made by positioning the motor hinge plate. The spindle height is 42 in. and floor space 49 x 26 in.

Ball Bearing Race Grinder

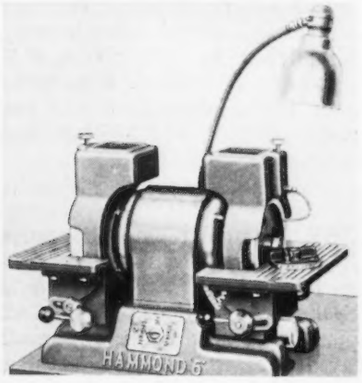
PRODUCTION grinding of the raceways of small ball bearing outer races is the object of a new machine built by the *Landis Tool Co.*, Waynesboro, Pa. This No. 1

Race-a-way grinder is intended for the smaller races up to and including No. 204. The Landis-Solex sizing device in combination with an electric timer permits the automatic performance of three operations during the same grinding cycle. First the race is rough ground, then at a slower grinding feed equivalent to a finishing operation. Finally grinding feed and work head oscillation stop, the work head is centered and for a short moment the wheel sparks out until the work is down to the exact size. The operator loads the work and presses the starter. Wheel spindle operates at 50,000 or 30,000 r.p.m. for the larger race sizes. The machine is precision-built throughout,

automatic feeds are hydraulically controlled and inspection is easily effected.

Double End Tool Grinder

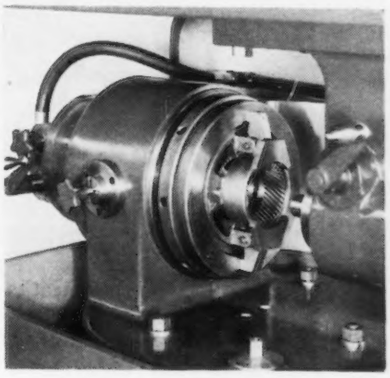
CARBIDE tool grinder using 6-in. wheels has just been placed on the market by *Hammond Machinery Builders, Inc.*, Kalamazoo, Mich. The new machine is ruggedly built. Heavy tilting tables are easily removable and fitted with tractors for accuracy in grinding angles. To install new wheels, a single clamp releases the table from the 1¾-in. supporting shaft. The sludge pan is easily removed and cleaned. Motor is a heavy duty type ½-hp., 3450 r.p.m. unit with oversize precision ball bearings and mounting silicon-carbide or diamond cup wheels. It is reversible for left or right hand grinding.



For wet grinding suitable wheel guard and coolant tank can be supplied.

Internal Gear Finisher

CROSSED-AXIS gear shaver for finishing internal gears is announced by *Michigan Tool Co.*, Detroit. This model No. 860-B-1 provides for mounting the cutter on the head of the machine while the work is located in a special driving device on the knee of the machine. The work is accurately located in the combination chuck and clamp by a locater of which the tooth dimensions correspond closely to those of the semi-finished gear. While the chuck ring is being revolved, four pins move outward from the face of the chuck and grasp the outside surface of the gear. Further movement of the chuck ring draws the two clamps tightly against the gear. The locator is then withdrawn into the driving head. The thumb knob on the front of the head is finally pulled forward to release the spindle, which has been held during this procedure. The cutter spindle is then brought forward into the



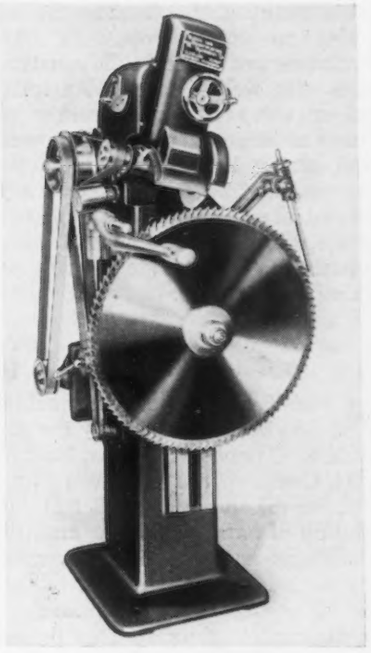
teeth of the internal gear. During shaving the work rotates while the cutter spindle reciprocates. The coolant enters through the spindle of the locator.

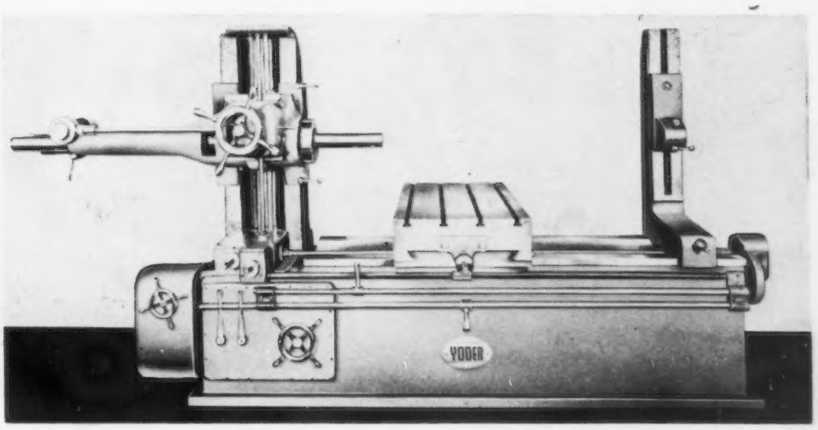
Horizontal Boring Mill

A NEW horizontal boring mill is produced by the *Yoder Co.*, Cleveland. This machine is built for precision operation and incorporates vernier scales on head, column and outer support. All adjustment screws and controls are conveniently located with starting, stopping and reverse being controlled through two bars running along the front of the machine. Power driven rapid traverse is provided for all movements. The main drive comes from the 5-hp. motor through a V-belt and multiple disk clutch, giving 16 speeds for head, saddle and table and 16 spindle speeds ranging from 8 to 380 r.p.m. Milling cutters and other attachment may be bolted directly to a flange on the outer end of the spindle. The table size is 24 x 48 in.

Saw Grinder

FOR sharpening its segmental saw blades the *Motch & Merryweather Machinery Co.*, 715 Penton Building, Cleveland, has developed the No. 1 automatic saw grinder used in connection with its Nos. 3 and 4 hydraulic cold sawing machines. Rigid construction and automatic indexing assure rapid, accurate sharpening. The completely enclosed drive is obtained by means of a single electric motor through belts. An oil pump provides lubricant to all internal moving parts. Wheel spindle and slide are located in the same plane to eliminate overhang. Accurate pitch is assured with fast speed for fine pitches and small diameter saws and slower speeds for the larger saws. Alternate high and low teeth can also be ground.



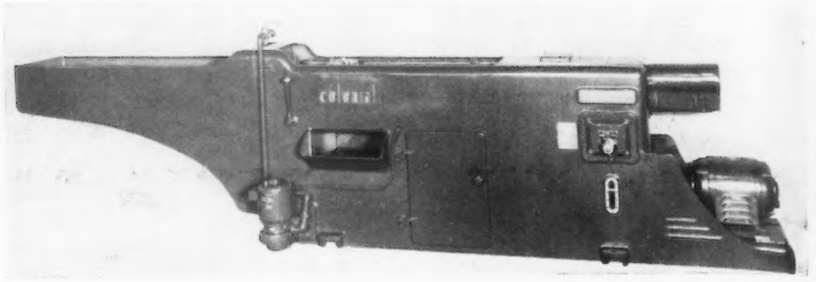


Horizontal Broaching Machine

NUMEROUS improvements are included in a new line of universal horizontal broaching machines introduced by *Colonial Broach Co.*, Detroit. These machines range in capacity from 3 tons and 36-in. stroke to 25 tons and 90-in. stroke. Shock-proof control mechanism is included to prevent impact of the starting lever at each end of the stroke. Vertical adjustment for the drive head is improved to provide greater flexibility for off-center special broaching set-ups. Provision for convenient mounting of spiral broach drive heads has been maintained, adapting the machine to spiral broaching. The cylinders are of steel tube construction with welded joints. An integral motor and pump bracket assure alinement, preventing wear and giving longer life with quiet operation. The face has two keyways placed centrally with the hole and 90 deg. to each other, affording a positive and accurate locating position for fixtures.

Cut-off Machine

A NEW abrasive cut-off machine has been developed by the *Andrew C. Campbell Division*, Bridgeport, Conn., of the American Chain Co., for the speedy and efficient cutting up of bars. This new machine maintains an oscillating movement across the surface of the cut to keep arc of contact practically uniform from start to finish. This design obviates the heat problem encountered at the center of the cut when an abrasive wheel passes through a 6-in. solid bar. Burning, surface hardening and glazing are eliminated and there is little or no burr on the edges of the cut.



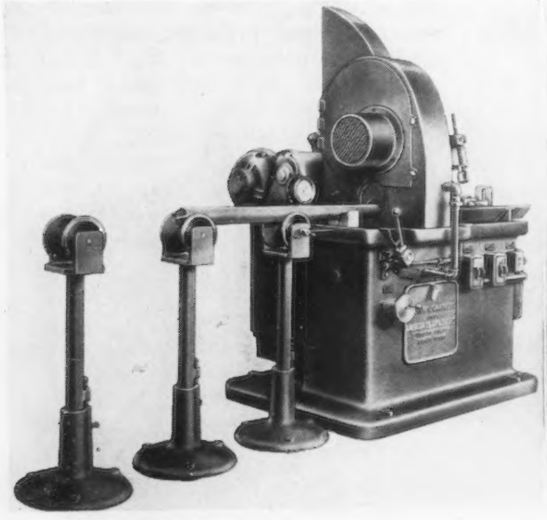
Shell Turning Lathe

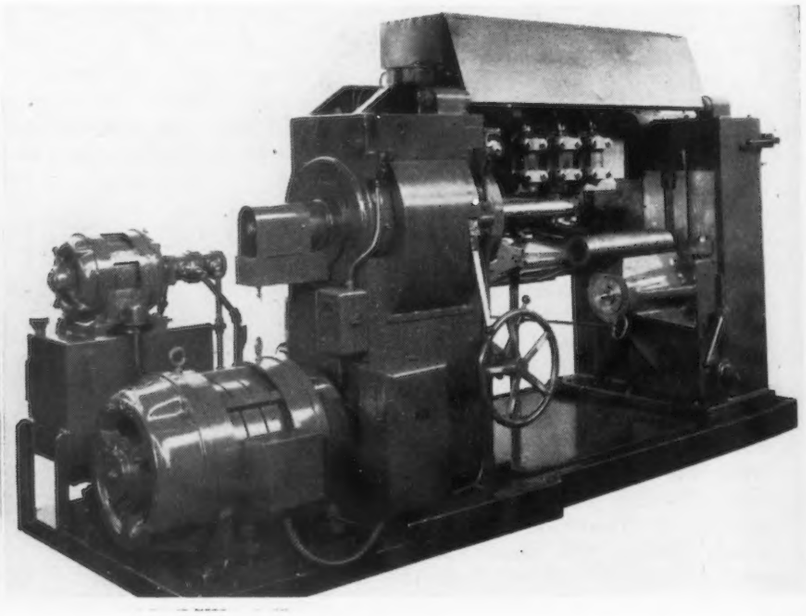
A SPECIAL shell turning lathe of British origin and unconventional design is being manufactured by the *Federal Machine & Welder Co.*, Warren, Ohio. The machine was designed by the Britannia Machine Tool Co., Ltd., of London, England, and is capable of turning shell with carbide tools at speeds up to 500 ft. per min. Except for spindle rotation, all movements are hydraulically actuated. Rough forgings are placed on an inclined conveyor at the rear of the machine and after machining the shell is rolled to an inspection table by a lower conveyor, also at the rear. Tailstock of the lathe is retractable vertically and in the lowered position acts as a handling trough in getting shell on and off the hydraulically clamped arbor. In the up position, the live center is advanced and held against the work under constant hydraulic pressure.

Turning tool boxes are supported from an overhead bridge between the two main castings, and the saddle on which they are mounted is traversed longitudinally by a hydraulic piston. Rollers at the top of the tool boxes engage a former bar on the bridge and the latter produces the desired shell shape as the saddle is advanced. On the return of the saddle, the rollers take another track which recedes the tools. Facing box tools, fixed to the underside of the bridge, move at right angles to the lathe axis and are controlled by formers attached to the underside of the saddle. Spindle is mounted in tapered roller bearings and is driven by V-belts from a 40-hp. motor. A separate 5-hp. motor drives two Vickers hydraulic feed pumps. Output is 18 155-mm. shell per hr.

Drill Press

FOR fine tool room and production work, as well as heavy drilling jobs, the *Sibley Machine & Foundry Corp.*, South Bend, Ind., announces a new 25 in. swing, all-geared drilling machine. Instant change of feeds and speeds are effected by two cam operated levers. Spindle speeds range from 75 to 1500 r.p.m., feeds from 0.005 to

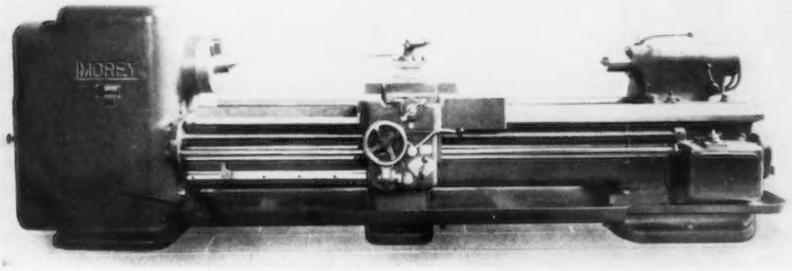




0.045 in. The six splined spindle can be operated either by power or hand feed; travel by power is 12 in. and by hand 12½ in. It takes Nos. 4 and 5 Morse taper shanks. All controls are within easy reach in front of the machine. The all-geared drive is obtained through a series of alloy steel, heat treated gears. Transmission is totally enclosed, but is a completely removable unit with the transmission shafts mounted on anti-friction bearings. Tapping is controlled through electrical reversing switches. Maximum distance spindle to base is 33 in. Table measures 18½ x 24 in.

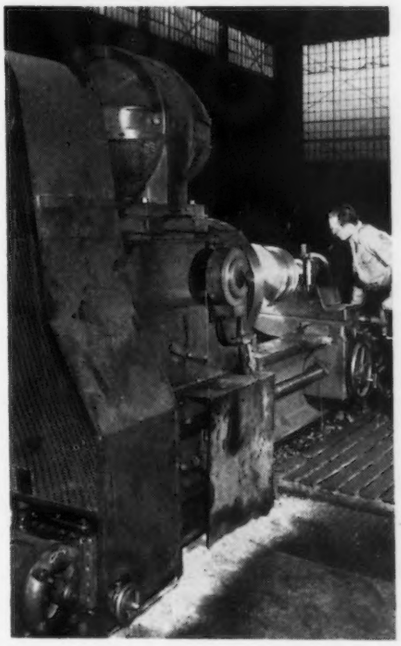
Heavy Duty Lathe

BUILT for single purpose operations and turning at maximum speeds and feeds with carbide tools is a heavy duty 27-in. manufacturing lathe, built by *Morey Machinery Co.*, 410 Broome Street, New York. Operation by non-skilled labor and finger tip control are featured. Spindle speeds can be set to suit each job by changing pick-off gears. Timken bearings are used in the headstock and all other bearings are anti-friction. Infinitely variable carriage feeds, with longitudinal stops in either direction, are provided. Large, direct reading dials are found on the apron. Swing over the ways is 28 in., maximum chuck diameter is 24 in. and swing over carriage slide, 11 in. For general work a 25-hp., motor is fitted and for heavy duty work a 50-hp. unit. Bed length is 12 ft. normally, but can be made longer.



Roughing Lathe

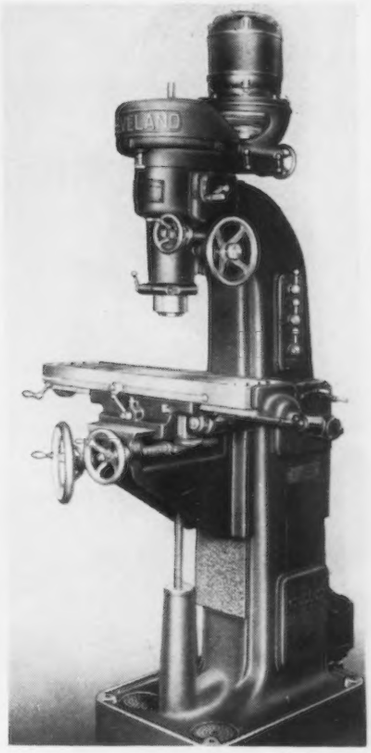
HEAVY duty roughing lathe for use on forgings and large sections was developed by *Heppenstall Co.*, Pittsburgh, and is produced and sold by *Lewis Foundry & Machine Division* of Blaw-Knox Co.,



Pittsburgh. This machine incorporates hydraulic feed, live tailstock center and selective stepless speeds and feeds. The machine has a simplified carriage, with hardened wear plates on the bed and cross feed slide. All rotating parts are mounted on anti-friction bearings. Dimension and production rates: swing over bed, 36 in.; swing over carriage, 20 in.; maximum distance between centers, 20 ft.; height of centers above bed, 16 in. Main spindle speed is 10 to 40 r.p.m. and 40 to 160 r.p.m. Feeds range from 0.020 to 0.450 in. The machine is constructed as ruggedly as possible. The tailstock has roller and ball bearings to absorb end thrusts. There is a 25 to 30 hp. main drive motor, a 3 hp. rapid traverse and a 1/3-hp. lubricating pump motor.

Vertical Miller

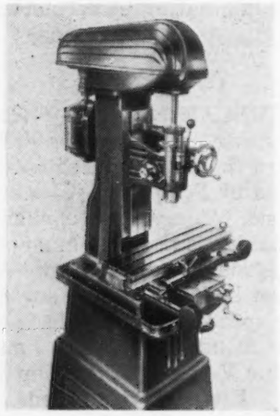
CLEVELAND No. 1 vertical milling machine has been added to the line of machine tools produced by *Sommer & Adams Co.*, Cleveland. The vertical spindle of this machine is mounted in an accurately ground quill on preloaded precision ball bearings. Four high spindle speeds are available from a flange mounted 1½-hp. motor through a V-belt and four step cone pulley. Eight lower speeds are available through back gears, giving a total range of 100 to 1850 r.p.m. The table has 12 automatic longitudinal feeds, ranging from 0.6 to 12½ in. per min., driven by 1/3-hp. motor. The column has a coolant reservoir in its base; pump



is optional. Table measures 8 x 32 in. Materials used are of the best quality throughout and finished for greatest accuracy.

Attachments for Vertical Mill

RECENTLY introduced by *Machinery Mfg. Co.*, 1915 East 51st Street, Vernon, Los Angeles, the Vernon vertical mill and jig borer can now be furnished with dial indicators and measuring rods, as well as with a profiling attachment. The standard set consists of



two dial indicators with jewel bearings, 1 in. range, double dial and tell-tale hand. Graduations are in 0.001 in. and the ample space between graduations permits visual interpolation. There are seven measuring rods, 1 to 4 in. in length, and troughs are provided for holding and attaching this equipment to the machine. This machine can also be supplied with a profiling equipment which will be found useful in duplicating molds, such as die casting dies, bakelite and plastic molds, etc.

Plate Planer

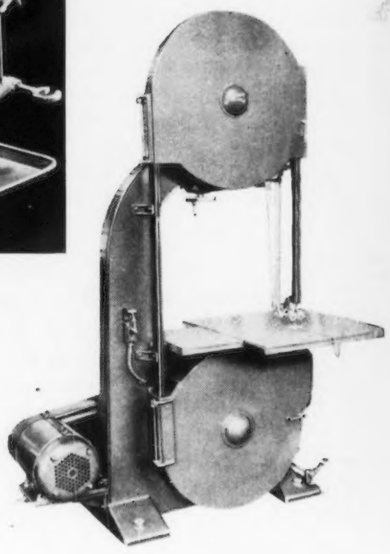
RECENTLY the Baldwin Southwark Division of the *Baldwin Locomotive Works*, Philadelphia, built a 40-ft. plate planer. This machine takes a ⅛-in. cut of a 1½-in. plate at a speed of 45 ft. per min. One or more plates up to 9½ in. are laid on the bed and held in place by 27 hydraulic cylinders which together exert a clamping force of 270,000 lb. These cylinders may either be controlled collectively or individually, and pressure is held by a small hydraulic accumulator, once pressure is built up by a motor driven pump. Double tooling permits automatic carriage reverse. Push button control on the carriage adjusts the tool holders vertically. The operator rides on the carriage and can devote all his attention to adjusting the cut. Gears run in an oil bath and the bearings supporting the drive screw are fitted with removable bronze liners.

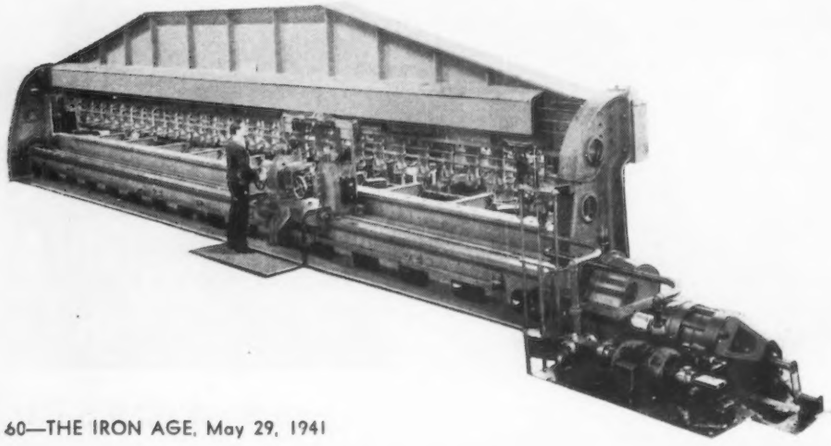
Tool Room Precision Lathe

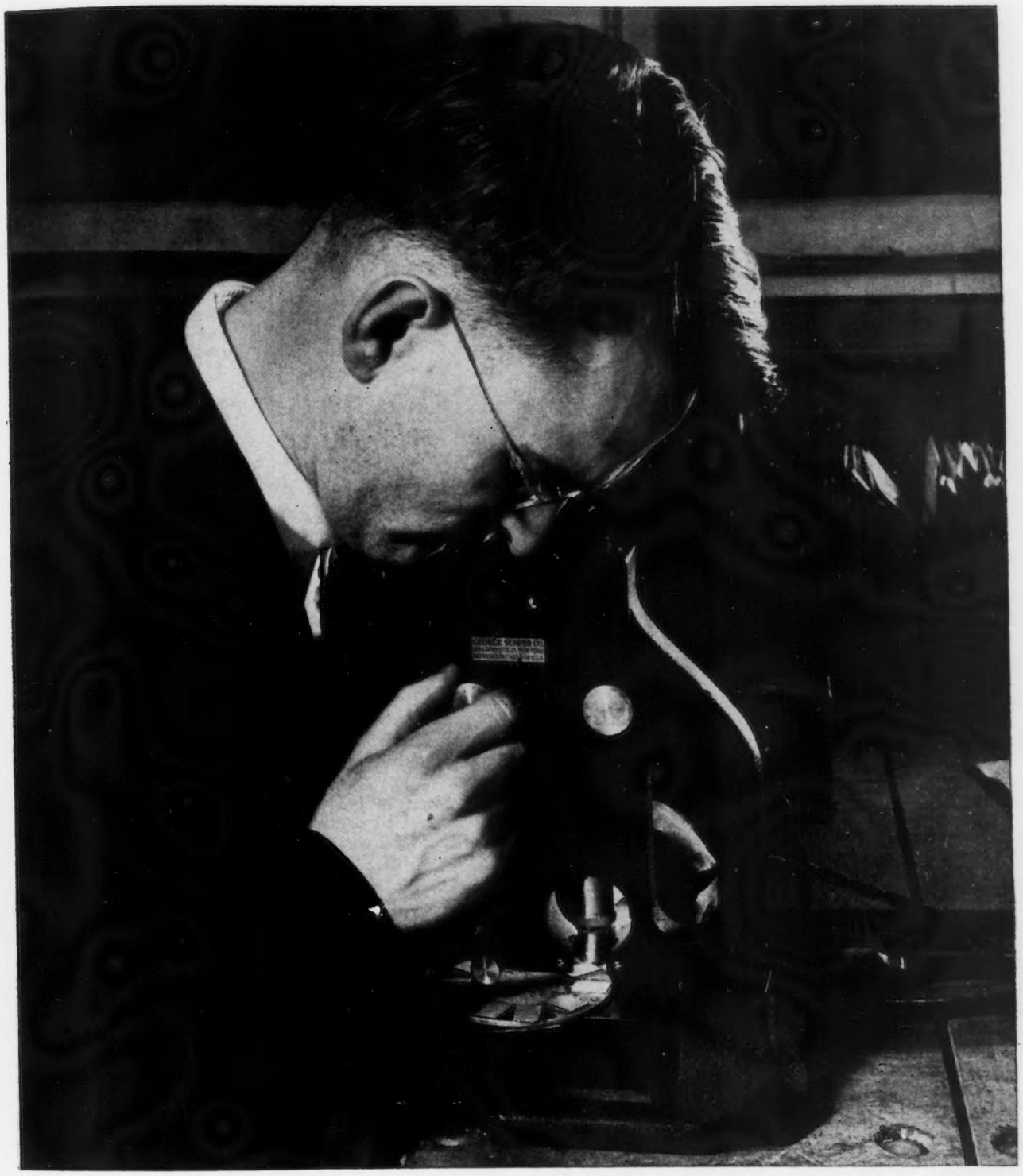
MODEL A 9-in. swing tool room precision lathe recently announced by the *South Bend Lathe Works*, South Bend, Ind., is well adapted by its size and design for small diameter work requiring accuracy and sensitivity. These bench or floor type lathes have a maximum collet capacity of ½ in. and a maximum swing over saddle cross-slide of 5½ in. Three bed lengths of 16, 22 and 28 in. are available. Motor driven models have 12 speeds ranging from 41 to 1270 r.p.m. Back gears may be engaged quickly by a wrenchless bull gear lock. There are 48 power longitudinal and cross feeds and 48 pitches of right or left hand screw threads. The apron is equipped with a powerful worm drive and friction clutch for operating the automatic power feeds. A safety interlock makes it impossible to engage the half nuts when the power carriage feeds are in use. In addition to the very complete standard supply of attachments an electric grinding attachment, millers, etc., can be had.

Large Capacity Band Saw

A SPECIAL 36-in. band saw was built by *Tannewitz Works*, Grand Rapids, Mich., for sawing aluminum alloys and magnesium up to 30 in. thick. To accommodate work of this thickness the guide rises above the table more than 36 in. Similar machines, built with special welded steel frames, are available in capacities up to those carrying 52-in. wheels. Motor and multiple V-belt drive offer the most effective means of securing good saw blade travel.







NEW KIND OF TROUBLE SHOOTER. For many years past, Revere Copper and Brass Incorporated has believed that the best way to avoid trouble is to *prevent* it. Reg Marsland is one of the dozens of Revere's trouble preventers. Step by step as your order goes through Revere's mill, he acts as a "watchdog" on specifications and procedures. The silent unfailing work of the Revere Methods Man is only part of Revere's service. But it is, perhaps, as important in speeding up defense production as any other. For it insures your getting the right metal at the start. Revere Copper and Brass Incorporated, 230 Park Avenue, New York.

(Advertisement)

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Labor situation calmer but some strikes are settled only on a temporary basis . . . Ford brings out new six-cylinder car . . . Aircraft ordnance work increasing in Detroit area . . . Big gun plant for Windsor, Ont.

DETROIT — Settlement of most of the major strikes, in effect or pending, has been brought about in Detroit, so the situation was relatively calm when 80,000 Ford workers went to the polls last week to ballot on the subject of union representation.

Some of the strikes had been only settled on a temporary basis, like that at Ex-Cell-O, for instance, and others were merely put off, like the proposed strike against Dow Chemical Co. at Midland. The big question today is whether a secondary wave of strikes may be on the way. It is no small question, for just as the 10c. per hr. rise in steel wages has had effects in General Motors, Hudson, Ex-Cell-O and other Detroit plants, it is feared that the revisions in these particular automotive wage schedules may have an upsetting effect on all other plants in the industry. It is the frank union policy today for each local union to make every effort to keep pace with the wage leaders. There is a general move on to reopen the issue on all contracts now in effect.

The General Motors agreement, in addition to a general 10c. per hr. increase, brought a refusal from the National Defense Mediation Board to the company's request for permission to institute a four-group, swing shift arrangement to enable it to work its plants 160 hr. a week, without payment of extra time for Saturday and Sunday work. The board expressed itself as unwilling to accept the plan as offered by the company and took the position that it "prefers to negotiate the plan after a national policy has been adopted by the labor policy board of the Office of Production Management, on the ground that this policy will affect industry in general."

An apprentice program was added to the basic GM-UAW contract with provision for a union-plant committee to study and make recommendations on the training of apprentices in the plant. The ratio of apprentices to journeymen is limited to one in 10 workers.

Wages Frozen, Union Shops Ruled Out

Of considerable importance is the freezing of the pay schedule for one year and the rejection by the mediation board of the union's demand for a union shop clause. Increased powers were granted to the impartial umpire to settle cases of violation of shop rules.

Establishment of a hospitalization service which will cover the entire families of employees was one of the points agreed to by GM. The present corporation hospitalization plan gives protection only to employees. Significantly, complete hospital and surgical care is being made available simultaneously by Chrysler Corp. and Briggs Mfg. Co. to 300,000 employees and their families.

After what looked like endless legislation, it has finally been decided that state unemployment compensation must be denied the 50,000 Chrysler employees who were out of work in the fall of 1939 because of the Dodge plant strike. The Supreme Court has held, in an historic decision, that all Chrysler employees were "directly involved" in the strike and, therefore, were not entitled to compensation for their lack of employment. The principal legal question before the court was whether the various Chrysler plants constitute one establishment in the meaning of the compensation act.

An aftermath of the other wage increases in Detroit is a demand from the union in the Dodge plant, Jefferson and Kercheval Avenue plants and the Marysville (Mich.) plant for a reopening of the Chrysler-UAW contract to seek wage increases. A new contract, signed last November, granted a 2½c. per hr. increase and froze the wage level until next Nov. 30.

Ford Announces a New Six

The quietest formal announcement of a new model ever made in the industry is that on the Ford six-cylinder job. A few brief paragraphs, no hullabaloo, announced that the engine is available as optional equipment on all deluxe and super deluxe passenger car types, as well as on commercial cars and trucks. These six-cylinder engines are the 90-hp. L-head type on which the company has been in production since late last year. The new cars will be priced $15 below current Ford V-8 prices on corresponding body types. No attempt is being made to sell these cars in volume because the engine has not yet been produced in large numbers. Because of priorities and the pressure of defense work, it probably will not be in substantial production until early in the fall, the company says.

A defense contract of unusual interest has been awarded to Superior Tool & Die Co. for manufacture of hydraulically operated gun turrets for Glenn L. Martin Co. Within a few months most planes turned out by Martin, Boeing, Douglas, Consolidated and others will be equipped with such revolving gun turrets, although only a few have been to date. So far, it is understood, the turrets have been produced to individual specifications, but later this year new units for Martin will conform to specifications that will be uniform among airplane manufacturers. Martin, in

WITH ANOTHER *Heyl & Patterson*

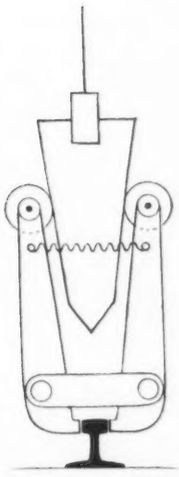
ORE BRIDGE

In its defense expansion program, Weirton Steel Company has again turned to Heyl & Patterson for a traveling bridge to handle the ore for its new 375,000-ton blast furnace.

This new bridge, of the same general type and dimensions as the one installed in 1926, will be the most modern in the industry. Built into it are extra sturdiness, latest safety features, new provisions for low maintenance and ease of control.

Weirton engineers, from long experience with this organization, know that Heyl & Patterson can be depended upon for materials handling equipment precisely fitted to the job. And they know that this equipment will be installed on scheduled time—ready to fit into production operations.

Why? Because Heyl & Patterson for more than 50 years has been continuously working with the engineers of the iron and steel industry. Because this organization is equipped to take full responsibility for any materials handling job—all the way from design to erection.



The new Weirton Ore Bridge will be equipped with Heyl & Patterson patented Automatic Rail Clamps, providing unequalled protection against wind velocities up to 120 miles per hour.

DESIGN • FABRICATION • ERECTION

LOADING and UNLOADING TOWERS — ORE BRIDGES
SKIP HOISTS — PIG CASTING MACHINES
SPECIAL CRANES — SPECIAL CARS — CAR DUMPERS
CAR HAULS — COAL and COKE HANDLING PLANTS
COAL TIPPLES AND PREPARATION PLANTS

HEYL & PATTERSON INC.

50 WATER STREET — PITTSBURGH, PA.

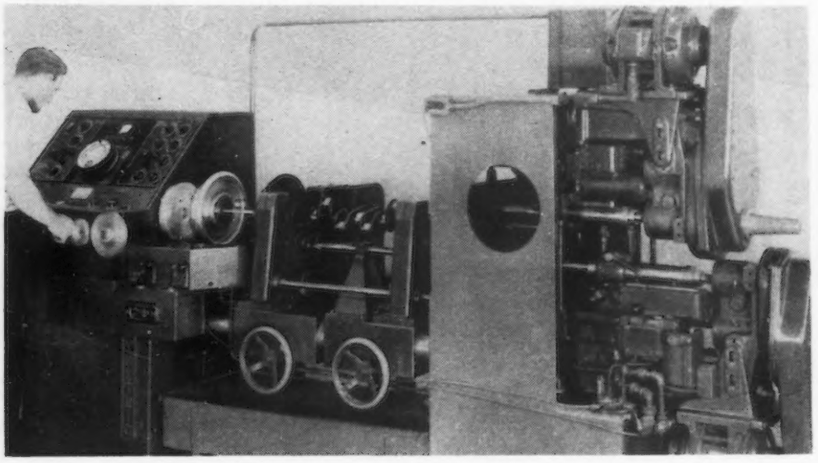
turn, will supply the other companies. Initial shipments will be for non-standardized turrets to be used only on Martin B-26 bombers, and switch to standardized types will be made in the fall. Two turrets are required for each bomber, and the volume to Superior is expected to amount to $300,000 to $400,000 a month.

Two 20 mm. automatic cannon are going to be produced in this area when tooling is completed. One is intended for mounting on aircraft; another—the Oerlikon—will be used for anti-aircraft purposes aboard ships. The Oerlikon will fire more than 400 explosive shells per minute and its principal use is in defense against dive bombers, according to Rear Admiral W. H. P. Blandy, chief of Naval Ordnance, who recently inspected the preparations being made by Pontiac to produce this gun. The other automatic cannon will be built by Olds under an $18,000,000 contract announced early in May with reference to "machine guns." This actually is the 20 mm. Hispano-Suiza aircraft cannon firing up to 700 rounds a minute.

So many orders for machine guns and cannon have been placed in Detroit that it is almost impossible to keep track of them—and also there is some criss-crossing of the lines, as instance the report now that Hudson's naval ordnance plant will do subcontracting on part of the Pontiac order.

Big Gun Plant for Windsor

Bids have been asked by the Department of Munitions and Supplies in Ontario for the erection of a plant to manufacture Browning anti-aircraft guns in Windsor. This plant will be financed and owned by the government and operated by General Motors of Canada through a subsidiary to be known as Border Cities Industries, Ltd. The plant is expected to cost $8,000,000 equipped and employ more than 3000 men. It will be one of the largest in the Windsor region devoted to war production.



NEWEST DEVELOPMENT in the automobile industry's constant research into the problems of motor vibration and efficiency is this new radio device for balancing Nash crankshaft assemblies. The assembly is placed in the radio balancer, which tunes in the most minute vibration and automatically corrects it by drilling away a tiny portion of metal from exactly the right spot. Nash is said to have the only three of these new machines now in use.

Bookings of Packard Motor Car Co. for aircraft type marine engines are being increased more than 100 per cent by a new contract amounting to upward of $20,000,000. This will lead to large scale expansion of the Packard marine division. In operation for more than a year now, the Packard marine division is one of the outstanding contributions of Detroit so far in the defense program, since it is here that the first real production of any war engines got underway.

Results of Ford Election

The final official tabulation of results of the Ford-NLRB election showed the following:

Rouge Plant

		Per Cent
UAW-CIO	51,866	69.91
AFL	20,364	27.45
No union	1,958	2.64
Challenged	3,492	...

Lincoln Plant

		Per Cent
7-2 UAW-CIO	2,008	73.24
AFL	587	21.43
No union	146	5.33
Challenged	181	...

R. J. Thomas, president of the UAW-CIO, announced after election that negotiations for a contract with Ford Motor Co. would begin "immediately." However, certification cannot come until after the first of June, and until that time the UAW will not be legally the sole bargaining agent.

The first demand of the union is going to be a 10c. per hr. wage increase for all Ford workers, "adequate" union recognition, a system of seniority to govern layoffs and rehiring, vacations with pay, etc.

The challenged votes will have some bearing on the outcome of the poll among the pattern makers in the Rouge plant, who voted in a separate category. Here, out of 402 ballots cast, 143 were challenged. The final tally on the "valid" votes was CIO 161, AFL 90, neither 8. The challenged votes could decide this election, so the NLRB will have to decide upon the merit of the challenges before the outcome among the pattern makers is known.

Output Highest Since 1937

The cessation of automobile plant strikes permitted a resumption of full production last week in the factories, according to Ward's Reports, Inc. The total output of 133,560 units is the highest that has been attained since the spring of 1937. Production in the previous week was 127,255, and output in the corresponding week of last year was only 96,810.

* * *

Nine Day Strike Ends At Allis-Chalmers Plant

La Porte, Ind.

• • • **Waving dinner buckets** and carrying an American flag, nearly 1000 employees of Allis-Chalmers Mfg. Co., recently paraded back to work here, ending a nine-day strike.

THIS RIBBON OF STAINLESS STRETCHES ACROSS THE NATION

FROM it, thousands of parts, vital to the smooth, safe functioning of American life, are being made. You find it in the magnetos and carburetors of today's speediest planes, in giant turbine blades, in the delicate mechanisms which control the ebb and flow of radio waves, in gasoline refining equipment, in valves—wherever performance is vitally important from Maine to California.

But maintaining the quality and uniformity that permits industry to entrust vital functions to Carpenter Stainless Steels takes skill, and care, and time, and equipment. Months ago, training of new men and purchases of new equipment were initiated at Carpenter. Gradually, these new facilities are coming into production. As they come in, they go at once into 24-hour operation. Today, Carpenter customers are being provided with the same high quality that has always been characteristic of Carpenter Steels.

For vital functions, Carpenter Stainless Steels will continue to serve industry and the nation.

THE CARPENTER STEEL COMPANY, Reading, Pa.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

Washington

BY L. W. MOFFETT
Washington Editor

• No general increase in steel price ceiling expected . . . Any changes adopted are unlikely to become effective before late summer . . . Ease with which unions get wage advances seen as threat to control system.

WASHINGTON — It can be stated definitely that the Office of Price Administration and Civilian Supply is not contemplating a general boost in the ceiling prices on steel. Only minor adjustments in the freezing order have been considered so far, the OPACS has stated. Minor is a relative term. To those wanting them, the proposed readjustments are important. Changes asked would permit higher prices on galvanized pipe, galvanized nails and on export sales and would give relief from the requirement to equalize freight rates with distant basing points.

Price Administrator Leon Henderson has said that the primary purpose of price control is to direct supplies into the right channels. Where such control does not serve that purpose he maintains that it naturally follows that adjustments must be made to fit the desired pattern. The channel for steel distribution increasingly leads to defense needs.

Adjustment of prices in the steel order except as indicated, are not being considered at all at this time. Furthermore, it has been stated that if any changes are made it will not be before late summer. The test period began with the second quarter and it is evident now that it will cover both that and the third quarter to see how the steel industry fares in the way of profits at prices quoted by the larger companies during the first quarter.

Dual Price System to Remain

Since there will be no changes in ceiling prices on steel, at least before late summer, if then, this means the dual price system will remain in effect. That is, small companies which have been asking higher prices than the larger ones, upon satisfactory showing to OPACS, will be allowed to continue their prices. This policy is unlike that followed by the old War Industries Board under Bernard M. Baruch. Emphasizing production as the greatest necessity, prices, as important as they were held to be, were given secondary consideration. With this principle in mind, prices were set so high that they made it profitable for the highest cost plants to produce defense materials.

To the contention that this policy permitted a wide margin of profits to low cost producers, the WIB made the response that these were reduced to a reasonable margin through excess profits tax. Mr. Henderson not only is out for the greatest possible production, but is also an ardent expansionist. But he has rejected the Baruch plan and claims that his approach also permits the greatest possible production by existing facilities, without allowing what are considered excessive profits to large producers. The operation of his plan is being watched with interest. A chief argument for this policy is that because of its elasticity it can be adjusted to different conditions.

There are those who think it will not only be cumbersome and therefore difficult to operate, but they believe it will develop complications. For one thing it has been pointed out that a contractor for defense work, unless protected by the contract, certainly would not buy steel from the higher-priced mills. Hence, since all mills are called upon to supply defense steel, the government itself will have to do business under a two-contract as well as a two-price system and will itself have to make up the differences in prices on identical fabricated jobs.

Price Legislation Being Considered

OPACS hopes by controlling special situations to keep the price structure in hand. Its proposed price legislation follows the policy it has established under the voluntary system, though Mr. Henderson has said there is no immediate need for such legislation. Nevertheless, it is under consideration. But even with legislation it is not seen how OPACS is going to maintain price control while disregarding wage increases so easily bullied from industry by rampaging organized labor and made possible by an amazingly politically timid Administration. The price legislation indeed may encounter some opposition in getting through Congress because it will not propose wage control. The opposition likely will not be formidable. Congress as a whole is too political-minded and too fearful of pressure groups to stoutly fight them. Consequently, wage control legislation may be considered out of the picture. This leaves industry high and dry and there is speculation what will happen to broad scale attempts at price control when the chief item of cost—wages—is given a free and easy hand to do as it pleases. If wage increases were reasonable and applied to the lower paid groups there would be no concern. On the contrary they deserve encouragement.

Wage Offset Technological Gain

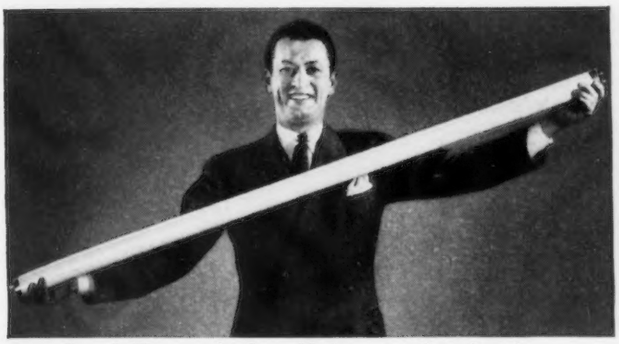
But sharp increases are being demanded and obtained by all workers, from the most skilled down to common labor and easily offset the lower costs per unit of production made possible by technological developments. It is this development on which economists often base contention that wage increases are

"He even worked on fluorescent lighting!"

A NEW SCIENCE STORY THAT CONCERNS EDISON AND YOU . . .

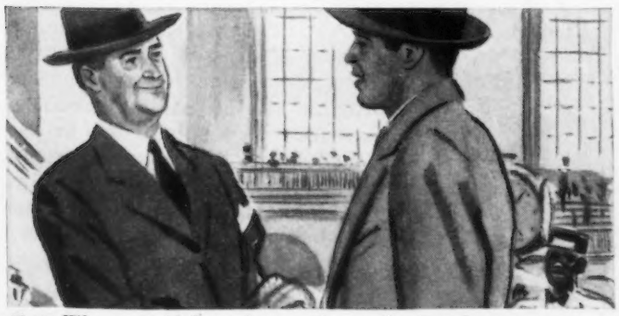
1 **JOE:** I'll be jiggered, fluorescent lighting in a club car!
AL: Brand new idea in lighting, isn't it?
JOE: Older than you think, Al. Even Edison worked on it!
AL: That man must have thought of everything!
JOE: Well, he *did* patent a fluorescent device in 1907!

2 **JOE:** . . . But General Electric spent years in research to produce today's high efficiency fluorescent lamps. They had to develop their own Phosphor—the material that transforms ultra-violet into visible light—then grind it almost as fine as that girl's face powder! For top efficiency it's got to be just so fine and no finer!



3 **AL:** Sounds like a peck of trouble just to make a lamp!
JOE: Yes, and that's only *one* thing G. E. does to make them give maximum light throughout life. In their Cleveland laboratory, they keep G-E MAZDA F (Fluorescent) lamps burning night and day till they go out! In three years, they've increased light output as much as 40% and reduced prices as much as 45%.

4 **AL:** What about fixtures? Does G.E. make those too?
JOE: No, General Electric doesn't make fixtures for these lamps. But they helped set up rigid standards for Fleur-O-Lier fixtures certified by Electrical Testing Laboratories. See the tag? Any manufacturer can get this certification if his fixtures meet the specifications. Over 40 companies cooperate to make Certified Fleur-O-Liers in all sizes and styles.



5 **AL:** Where would I get fixtures for my business?
JOE: Your G-E lamp supplier can show you a full line of certified fixtures with G-E MAZDA F lamps, ready to use!
AL: I'll take General Electric's word for it!
JOE: Right! You know the story of Edison's first *bulb?* Well, today's G-E bulbs give 10 times the light at 1/10 the price—and G-E MAZDA F lamps are following right in their footsteps!

NEW QUANTITY DISCOUNTS
$5 worth for $4—$15 worth for $11.25

Is your company taking advantage of new low quantity prices on all types of G-E MAZDA lamps? 20% off, $5 to $15 list; 25% off, $15 or over. New and larger discounts to contract purchasers. See your G-E lamp supplier!

G-E MAZDA LAMPS
GENERAL ELECTRIC

MAZDA: Not the name of a thing, but the mark of a research service

justified. To a degree the argument is widely accepted, but they do not justify many wage demands that have been forced upon industry. The fact remains too that technological developments have lowered prices to the advantage of labor, and that is equivalent to a wage increase.

↓ ↓

Washington

• • • **The Navy Department** has awarded a $9,185,990 contract to the Consolidated Steel Corp., Ltd., Los Angeles, for manufacture of ordnance equipment. Another Navy contract, amounting to $5,651,605 was awarded to the Willys-Overland Motors, Inc., also for the manufacture of ordnance equipment.

↓ ↓

Washington

• • • **A minimum wage of 40c.** an hour in the gray iron jobbing foundry industry, as proposed by the industry committee under the Fair Labor Standards Act, will be up for consideration at a public hearing on June 4 at the Department of Labor Building.

Ford Asked To Build 4-Engined Bombers

Washington

• • • **Manufacture and assembly** of Consolidated four-engine bombers of the new Ypsilanti plant of the Ford Motor Co. has been requested by OPM Director General William S. Knudsen. At present the Ford company is the only automobile manufacturing plant to be given the job of turning out complete bombers although other automobile manufacturers will continue to turn out aircraft parts for assembly in aircraft plants.

The former General Motors executive told a press confernce on May 22 that three other aircraft companies also have been asked to gear their production efforts to turn out heavy bombers at the rate of 500 a month by the fall of 1942. Accordingly, letters of intent to award contracts for the accelerated bomber production were given to the Ford Motor Co., Detroit; the Boeing Aircraft Co., Seattle; the Vega plant, Lockheed Aircraft Corp., Burbank, Cal.; and the Douglas Aircraft Co., Inc., Santa Monica, Cal.

General Motors Corp., Chrysler Corp., and Hudson Motor Car Co., are expected to make aircraft parts for plants now under construction at Kansas City, Mo., Dallas, Texas, and Omaha, Nebr. These plants were authorized under the Congressional program for 2400 medium bombers. Plans for further expanding medium bomber production ultimately will be made.

Recent unofficial estimates place the heavy bomber production at 100 planes a month. Assembly plants for this type of bomber are being built at Tulsa, Okla., and Fort Worth, Texas. They will be supplied with parts manufactured by the Ford Co. and are expected to be able to increase production by 100 heavy bombers a month early in 1942.

In connection with the heavy bomber program, aluminum production will be stepped up by 600,000,000 lb. annually, including an expected importation of 200,000,000 lb. from Canada. This, it is estimated, will increase United States supplies of aluminum to around 1,600,000,000 lb. annually, most of which increase is expected to be absorbed by the heavy bomber program.

The Reconstruction Finance Corp. has set aside $350,000,000 for plants to expand heavy bomber production, $250,000,000 for increasing aluminum supplies, and $50,000,000 to double the magnesium program. The latter program has been designed to produce about $80,000,000 lb. annually.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Kelly, of Machinery Institute, Urges Tax Changes, Economy

Washington

• • • **A request that Congress** economize, lighten industry's taxes, and remove tax inequities bearing on the capital goods industries was submitted to the House Ways and Means Committee last week by William J. Kelly, president of the Machinery and Allied Products Institute.

Mr. Kelly recommended a 6-yr. carryover of corporate net losses, increase in normal rather than in excess profits tax rates, the privilege of selecting three of the years from 1935 to 1939 in com-

puting excess profits, and a 6-yr. carry-over of unused excess profits tax credit.

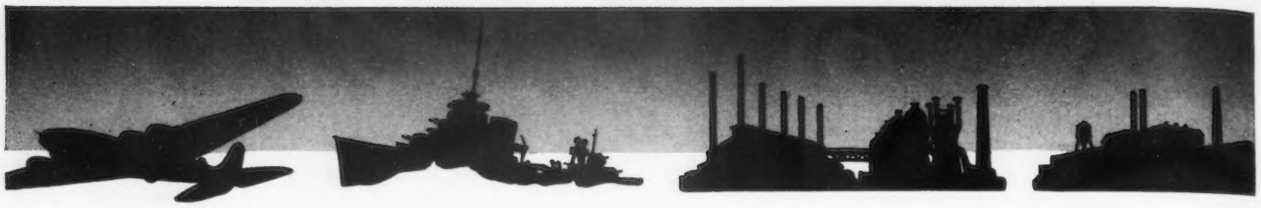
While Mr. Kelly was urging the committee to cut government expenses, President Roosevelt placed on Congress responsibility for effecting economies. It is easier, he told his press conference, to propose reductions than to select them specifically, and it is up to Congressional proponents of economy to find ways of economizing.

Photo by Harris & Ewing

CIVILIAN DEFENSE CHIEF: Lacking "get-up-and-go" at many points in the defense organization at Washington, President Roosevelt appointed energetic Mayor Fiorello LaGuardia of New York as Administrator of the Civilian Defense program. First to offer its aid to LaGuardia was the Iron and Steel Scrap Institute.

SIGNALS

ON THE WEST COAST



• Small plants taking on more defense work to keep personnel intact . . . Aircraft union split for better control . . . Deliveries of metal working equipment on West Coast improve . . . Plane companies spur research . . . Ryan backlog sets record.

SOMEONE has erased the old handwriting on the national defense wall which far Western industry is helping the military men build around America, and a new inscription is rapidly becoming more legible.

Only a few months ago smaller manufacturers whose products bore no apparent relation to military production saw a message of their part in national defense which read something like this: "If you're smart this time, you won't scramble for national defense orders. There's not going to be the same profit in defense orders as in the last war. Take care of your regular customers; continue the manufacture of your normal line. Then, when the war is over, you won't find yourself with a vanished market, but instead you'll be knee-deep in the goodwill and appreciation of your old customers, and those of the other fellow who concentrated on defense work."

Whatever merit that philosophy may have had as sound business practice, it has been rubbed out in the eyes of most manufacturers. The new inscription is brusque and to the point: "If you want materials, you'll need priorities. Priorities go only to those with national defense work. You may be committing business suicide if you don't take care of your old customers, but if you want to keep the wheels turning, and keep your trained personnel working for you, you had better put them to work on defense orders."

Some firms have not found it out yet, but the fork in the road to war which bore the direction arrow labeled "Profits via Normal Products" leads right back into the main highway. At least, that's what far Western manufacturers dependent on scarce materials tell us they have discovered.

Union Split for Better Control

Some hint of how swelling aircraft employment will be handled by the American Federation of Labor comes from Seattle where Local 751 of the Aeronautical Mechanics' Union last week was split into six units in order to effect better control over 11,000 employees of the Boeing Aircraft Co.

Notable is the fact that this new setup retains the industrial form of organization under the AFL International Association of Machinists. Thus, as far as this unit of the aircraft industry is concerned, there is no choice between craft unionism and industrial unionism, but only between the top dog AFL and a small but petulant CIO rival organization.

Division of the union will be made along these lines: Lodge No. 751—Wing line assembly, final assembly, cable, electric, tubing, fabric and upholstering, experimental, wood - model - finish - mock up and maintenance and craters' shops;

Lodge No. 751-B—Shears and routers, punch press and saws, brake and wrap former, press forming, hammer forming, plaster and foundry, bench machine and primary shops;

Lodge No. 751-C—Tank assembly, welding, jigs, tool and die, machine shop, jig storage, tool rooms, template, steel heat treat, electric plating and polishing, sand blast, anodic or protective finish and rural heat treat shops;

Lodge No. 751-D—Body jigs and assembly, wing jigs and sub-assembly and control surface structure shops; Lodge No. 751-E—Riveters, buckers, rivet packers and bar bolts. Lodge No. 751-F—Production, tool planning, stores, shipping, transportation, inspection, timekeeping and shop clerks.

Victim of Communist Strategy

The stormy history of Local No. 751 as a single unit was climaxed April 7 when Grand Lodge President Harvey W. Brown suspended its charter, charging the local had been a "long-suffering victim of Communist strategy." The reinstatement of No. 751 as a group of smaller units is designed to combat Communist infiltration, according to officials. Further amoeba-like expansion of the union is anticipated as the Boeing payroll climbs toward the 20,000 mark.

The rival CIO union leadership is comprised chiefly of members who have been expelled from the AFL group for Communist leanings. So far, organization efforts by the CIO, consisting of sound trucks and distribution of literature, have met a cold response from the workers, including rotten egg showers on more than one occasion.

The Boeing management takes the attitude that the dispute is "over the fence" to them, and has not publicly concerned itself with the matter.

For the first time in several months, scattered reports indicate better delivery schedules by southern California manufacturers and manufacturers' agents on metal treating and working equipment. One heat treating furnace manufacturer offers eight week's delivery on some smaller models, a substantial improvement from the situation at the beginning of the year. The improvement is attributed to the completion or near completion of tooling for scheduled aircraft industrial expansion in so far as the

southern California district is concerned.

Whether the better situation reflects merely a temporary lull or whether the hump has been passed, depends to a large extent on whether aircraft plants in this area will continue to grow as the result of an enlarged plane building program. If improvement can be effected in instrument deliveries, further relief may be expected in many factory units, it is inferred.

Particularly noticeable among the aircraft makers is the increased emphasis upon research, particularly with regard to manufacturing methods, and secondarily with regard to materials. In the past, lack of funds prevented any large scale experiments, and mutual suspicions among the companies prevented any great drive for the industry as a whole. Cut-and-try was the general rule.

With the advent of mass production contracts attempts were made to adapt automobile industry practices. It is now generally realized that this can be done only to a limited degree.

The problem of the plane makers in obtaining high speed production was to reconcile close tolerances with labor lacking technical training. In this situation, laboratory findings could only be applied to a limited degree. Now, with personnel better trained, the gap between laboratory conditions and shop practice is beginning to close and it seems likely that findings of research departments will be put to better use by the industry as a whole.

With the receipt of a new $4,134,205 contract for Army training plans, Ryan Aeronautical Co., San Diego, announces that its backlog is now over $16,000,000, a new all-time peak. The company also states that contracts have been signed for products of the Exhaust Manifold Division exceeding $2,000,000. Deliveries of the Ryan manifold alone have been running in excess of $320,000 a month, officials state.

Indicative of the broadening export market available to the West Coast, provided cargo space can be obtained, was the statement last week by J. G. Gilbert-Lodge, governing director, Gilbert-Lodge & Co., Ltd., Australia, that that continent "increased its industrial output eight times over 1939 last year, and that by the end of 1941 it is expected production will be increased 16 times over that of normal years."

Non-Union Forces Win In Chrysler Plant Vote

Kokomo, Ind.

• • • **For the second time,** employees of the Chrysler plant here have voted against union representation. In an NLRB election, 450 workers voted against any union; the CIO United Automobile Workers polled 310 votes, the AFL United Automobile Workers 27. In 1939 the plant employees voted similarly.

10,000 Weirton Employees Benefit By Vacation Plan

Pittsburgh

• • • **Approximately 10,000** wage and hourly employees of Weirton Steel Co. will benefit by an optional plan of vacations with pay to apply during 1941. Thomas J. Long, employee representative chairman said that the plan agreed upon by the management and Weirton Employees' Representatives was "the most liberal in the steel industry," and will involve a vacation payroll of $550,000.

Employees have the option of taking their vacation or of working and taking full vacation pay in a lump sum. Length of employee vacations depends upon length of service, and ranges from two days' vacation for one year's service to ten days' vacation for service of 15 years or more.

Koppers To Build 21 Coke Ovens for Chester Plant

Pittsburgh

• • • **Koppers Co.,** engineering and construction division, has been awarded a contract by the Philadelphia Electric Co. to build a battery of 21 coke ovens at its byproduct coke plant, Chester, Pa. The ovens, of the Koppers-Becker underjet type, will have a total coal carbonizing capacity of 142,000 tons a year. They are to be completed in April, 1942.

Photo by International

FREY TAKES A CHANCE: Few labor leaders in steel and other industries actually march in strike or back-to-work movements. However, when picket lines at strike-bound West Coast shipyards threatened non-striking members of the Bay Cities Metal Trades Council, John Frey, AFL vice-president (circle above), led his men into the Moore Drydock plant.

Fatigue Cracks

BY A.H.DIX

He Flies Through the Air

• • • Ever since it appeared here four weeks ago we have been puzzling over this photograph in a Cuyahoga Spring Co. ad. Was the salesman actually in the air when the picture was taken? Is it a composite photograph? Or were both figures on terra firma when the shutter clicked and was the illusion of levitation accomplished simply by turning the photograph about 22 deg. to the right? We pant for an answer.

Or Harlem Side Arms

• • • K. Misegades, North Chicago, Ill., sends us a clipping from the *Wall Street Journal* listing material substitutions in the making of peacetime products. Among them is:

Product	*Former material*	*Substitute material*
Cutlery	Steel	Laminated wood

Probably for pocket knives for cub scouts.

Stopper

• • • How Not to Get Caught with Your Bridges Down—*Armco Drainage Products Assn., Middletown, Ohio.*

A THIEF in your pump pit?—*Fairbanks Morse.*

Under-Exposure Causes Boner

In the May 8 article, "Much More Steel," your compositor makes the author say:

"All entertainment is effectively eliminated by static baffles."

From many years of fishing entertainment out of the air, I'd say he was right, though it might be written "baffling static."

Apparently neither compositor nor proofreader is subject to the draft, as in that case "entrainment" would not have connoted "entertainment" and the author's meaning would not have been garbled beyond recognition.

—*Elton Sterrett, Houston, Tex.*

Errors don't just happen. They are caused by something deep in the subconscious, and if you have a sufficiently vivid imagination and are good at conclusion broad-jumping you can always find the reason for a mistake. In the present instance it is obvious that the compositor attended a burlesque show the night before. Owing to strict censorship, burlesque shows are now operating under wraps. The compositor was thwarted. A repression was created in his mind, and when he saw the word "baffles" reflex action caused him to tap out the word "entertainment."

Pulse-Raiser

• • • We confess that in normal times we find the market-reporting section among the less exciting features of your favorite family journal. But now, with the supply situation in a highly delicate state, the market reports throb with interest, and we commend them to you for close reading. See pages 104 and 115.

Which reminds us to pass along this gem we found in the non-ferrous page:

Bids have been reissued by the Navy Department for 560,000 lb. of Grade A tin, delivery within 90 days, on the basis of no arrival—no sale.

What could be fairer?

Giant Slipstick

Mr. Abraham (president of the Ruberoid Co.) runs his business with three symbols—a barometer on the wall facing his desk, a glass ball on his desk and a 100-foot slide rule in the drawer of his desk.—*New York World Telegram.*

He must keep it in that extra wide center drawer, the one with the overhead traveling conveyor.

Deac Has His Come-uppance

The Sumner Line was evolved in 1937 by a merchant shipmaster, Captain Thomas E. Sumner, of Boston, Mass., and not, as "Deac" says, by a naval officer in the U. S. S. Sumner.

The Marc St. Hilaire method is an excellent and accurate method . . . However, it is safe to say that this method is almost entirely supplanted now, with both merchant and naval navigators, by the very simple and accurate methods of Weems, Driesenstok, and others. These short methods allow a navigator to "shoot" several stars, work out the sights, and plot the "fix" in a very few minutes . . .

—*J. M. Sheehan, U. S. Navy Yard, Philadelphia*

C. H. ("Chet") Ober, one of this journal's advertising ambassadors, who used to be with the Coast and Geodetic Survey and who, as a diversion, pilots a class in navigation at a Connecticut yacht club, says the best method is the "211," so-called because it is described in Hydrographic Office Publication No. 211.

W. H. Rastall's questions about sunrises and sunsets are ducksoup for Chet. In the northern hemisphere the sun rises in the true east and sets in the true west on Mar. 21 and Sept. 23, at 6 A. M. and 6 P. M. respectively, local apparent time.

At the north pole the sun always rises and sets in the south, and at the south pole vice versa. Ho hum. Ask us something hard.

Tool Steel Book on the Way

• • • Owing to a heavy demand, the tool steel list now running serially in THE IRON AGE (see page 51) will be printed in booklet form when completed. Copies will be supplied at a nominal charge.

Superfluous Prefix

In a recent article you mention "deskinning" nickel anodes. Does this mean taking off the skin? If so, does "skinning" mean putting it on?

—*Deac*

Skin, unskin, deskin—no difference. All mean taking off. You can, therefore, refer to a mule-skinner as a flay boy. *Flammable* and *inflammable* mean the same, and sometime we are going to find out whether seeded or the unseeded raisins are the ones without seeds.

Puzzles

• • • Last week's traveler walked 1 mile and rode 7 miles.

We picked this one up from the Dictaphone Corporation's excellent little house magazine, *It's Said and Done.* A solution in five minutes places you definitely among our better minds:

A ship is twice as old as the boiler was when the ship was as old as the boiler is. The combined ages are now 49 years. How old is each?

CAST OF Copper TO MAKE *BETTER MOTORS!*

THERE'S no motor so capable of standing up under strenuous service as the motor with the one-piece rotor winding centrifugally cast of SOLID COPPER. For copper has better electrical conductivity, better thermal characteristics for motors . . . than any other metal.

So for years manufacturers have striven to produce such rotors. Many have succeeded in centrifugally casting windings of *other* metals. But *only* Fairbanks-Morse makes a centrifugally cast rotor with the windings of solid copper.

F-M Motors with the patented features of Copperspun rotors better withstand constant plugging and reversing, give added years of trouble-free operation, reduce operating costs. Their plus values are worth investigating. Write Fairbanks, Morse & Co., Dept. E-38, 600 S. Michigan Avenue, Chicago, Ill. Branches and service stations throughout the United States and Canada.

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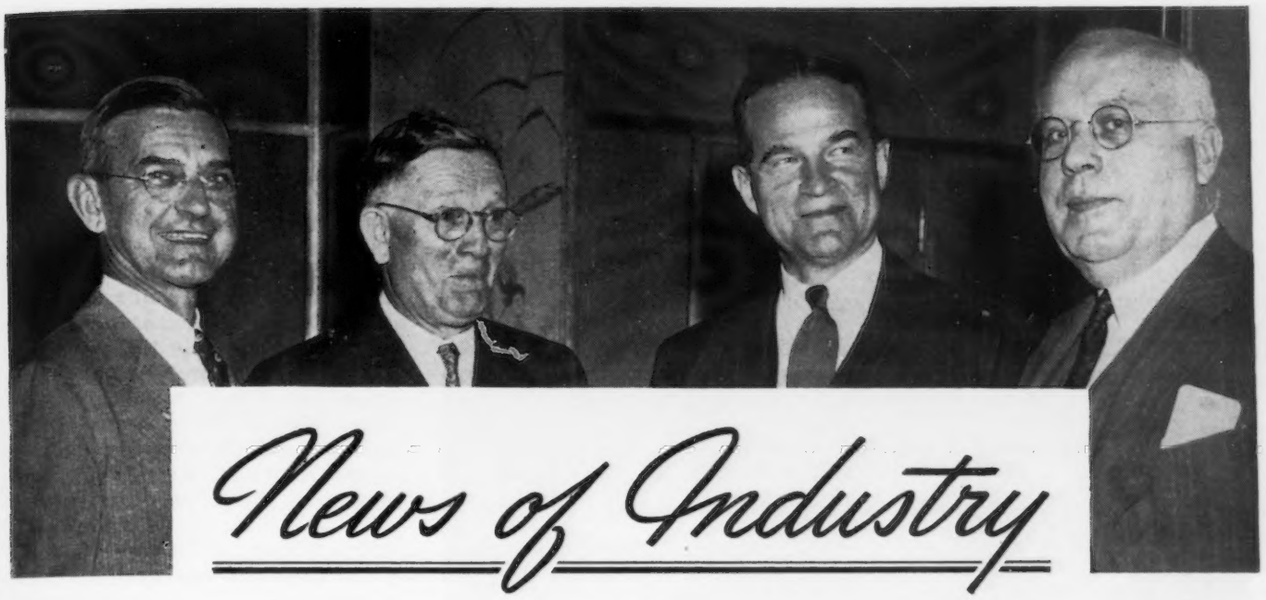
. . . . *Charles R. Hook, president, American Rolling Mill Co., H. E. Lewis, chairman, Jones & Laughlin Steel Corp.; Irving S. Olds, chairman, U. S. Steel Corp.; E. J. Kulas, president, Otis Steel Co.*



News of Industry

Steel Leaders Warn Against "Fantastic" Expansion of Industry

WARNINGS against over-expansion of the iron and steel industry were sounded by the two principal speakers at the annual meeting of the American Iron and Steel Institute of the Waldorf-Astoria Hotel, in New York, on May 22.

Irving S. Olds, chairman of the United States Steel Corp., who appeared for the first time as a speaker at an institute annual meeting, and Walter S. Tower, president of the institute, who was reelected to this position, both stressed strongly the dangers of "forced expansion" on the staggering scale that has been proposed by some government spokesmen in Washington.

"Of late there has been much talk in the press as to a possible substantial lack of productive capacity in the steel industry," said Mr. Olds. "I am sincere in believing that no group in this country is more anxious than the executives of the steel industry to fill promptly all of this nation's legitimate requirements, or more ready, in case of need, to extend existing facilities to meet the demands of the present emergency. However, I must confess great difficulty in following the argument recently advanced that because the national income is expected to soar next year to one hundred billion dollars or more, this country's steel production in 1942 will have to be in the neighborhood of 110,000,000 tons of ingots to meet the estimated demand.

"I can understand," he continued, "that the steel industry must provide all of the steel required for the nation's defense needs, even though that be a constantly growing amount corresponding with the enlargement of our national program to keep pace with changing conditions in the world. There has been no failure to date in supplying the steel needed for defense projects and I do not anticipate that the contrary will be true in the future."

Admitting that "the steel industry has a heavy responsibility in insuring an adequate supply of steel to meet all proper demands of the future" and that these needs "may well involve some enlargement of existing steel capacity," Mr. Olds argued that any such expansion should be the result of long range planning of a statesmanlike nature.

"So long as present abnormal conditions continue, we cannot and should not expect either business as usual or economics as usual," he said. Under present

Winston Churchill Cables Greetings

• • • Walter S. Tower, president of the institute, read the following cablegram from Britain's Prime Minister, Winston Churchill:

"Hearty greetings to the American Iron and Steel Institute. I well remember my harmonious relations with the United States steel makers and the valuable contributions which they made to the successful outcome of the War of 1914-18.

"I recognize with gratitude the still greater effort which they are now making in the cause of worldwide liberty."

conditions, he added, plan for enlargements of facilities at this time will not be sound if based chiefly upon an estimated civilian steel demand growing out of an abnormal period of extraordinary defense effort and resulting extraordinary expenditures. He declared that the steel industry should be given full opportunity to assist the defense authorities in the solution of this much-discussed question of adequacy of present steel making and finishing facilities.

. . . . Eugene G. Grace, president, Bethlehem Steel Co., and John T. Whiting, president, Alan Wood Steel Co.

An important consideration, he contended, is "whether the public will be better served by the creation of vast additional facilities, whose days of useful operation may not extend beyond the present emergency, or by limiting to some extent the need for such additional capacity through placing reasonable restrictions on civilian demands for steel for non-defense purposes. If the creation of additional capacity is justified only by the exigencies of the present emergency, it seems clear that everything of a reasonable character should be done to prevent excess capacity becoming a serious problem at the conclusion of the emergency. Of course any such study of enlarged capacity should also embrace careful consideration of what restrictive effect a substantial steel expansion program might have upon the available supply of materials, machinery and skilled personnel urgently needed in other current defense activities.

"A further factor is the long period of time required to build a steel plant. Modern steel mills are costly affairs, in the erection of which the public welfare is immediately concerned. Neither their building nor their abandonment should ever be undertaken lightly. A large steel plant built at the wrong location, or an unnecessary steel plant, may well result in a serious disruption of our economy at the termination of this emergency. Its abandonment is certain to produce unemployment problems, and maybe result in a ghost town. Government ownership and operation of a steel mill should naturally be avoided. Speed and economy of production and the highest quality of product can best be attained by permitting this task to be performed by those experienced men who have spent their lives in the steel business. Then, too, the entry of the government into a field of manufacturing of such a normally peacetime character as steel making runs counter to the system of private enterprise which is so closely associated with and so responsible for the remarkable growth and development of this country. Such ownership and operation by the government seems unneeessary, unless the steel industry as a whole fails in providing the government the proper amount of cooperation and support in this crisis. I am confident that there will be no such failure on its part."

Mr. Olds said that no one in the steel industry has a very clear picture of the demands that may be made upon it during the next two or three years or of the ability of the industry to meet these demands with existing facilities and those now under construction. However, he counseled that any expansion which may be undertaken should come only after formulation of sound plans by the government and the industry in cooperation.

Looking beyond this emergency, Mr. Olds said that the iron and steel industry will undoubtedly be faced with post-war problems of a very difficult nature. "If the abnormal demands of today call for the building of steel making and finishing facilities vastly in excess of peacetime requirements," he said, "the return of peace will bring with it that most difficult of all our recent depression experience—idle plants and idle men—a productive capacity substantially beyond that needed to meet the then current demand for steel." He said that great care should be exercised in the location and character of any new facilities of this kind so as to reduce to a minimum the scope and seriousness of such a problem. He advocated research in finding new uses for steel as one way to take up some of the shock of the post-war adjustment. It seems clear,

Coming Events

June 1 to 6—Society of Automotive Engineers, summer meeting, White Sulphur Springs, W. Va.

June 23 to 27—American Society for Testing Materials, annual meeting, Chicago.

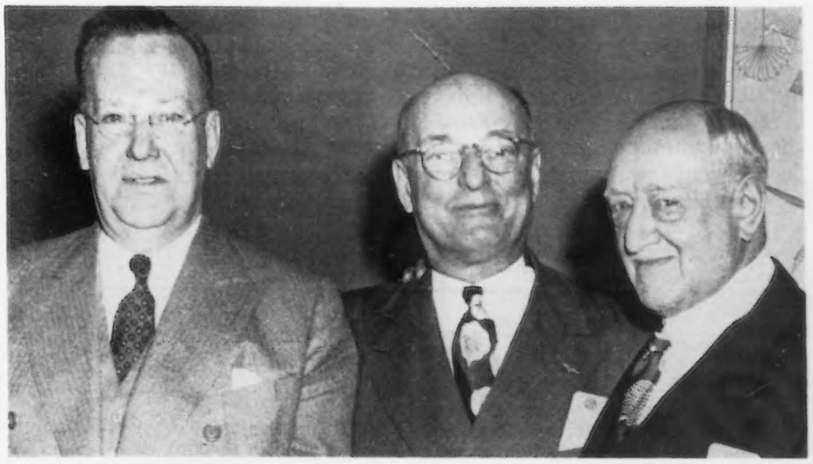
he said, that export trade conditions for one thing will not be the same after the war as those which existed prior to the war.

If democracy survives, free enterprise, which cannot be disassociated from it, must also survive, Mr. Olds concluded; otherwise the effort of today will not have been a success.

Walter S. Tower, president of the institute, in his discussion of the steel capacity situation, referred to the fact that barely more than a year ago the industry was under fire before the Temporary National Economic Committee for having greatly over-expanded. "Today the complaint is not of too much capacity, but of too little capacity," he added. "Instead of the accusation that steel makers stupidly refused to write off alleged obsolete equipment, they are now charged with stubbornly objecting to expansion on a fantastic scale. On one side of this controversy a group of Administration economists have maintained that defense, plus British, plus civilian, demands for steel in 1941, and especially in 1942, will substantially exceed the ability of the industry to produce. It has been reported recently that the conservative estimates from such sources foresee a deficit of 10 million tons of steel ingots in 1942, while the really enthusiastic have tilted their deficit as high as 30 millions.

"On the other hand, members of the industry generally have taken the position that the industry will be able to furnish much more steel than any possible requirements can amount to for the defense program and for Britain, and that civilian consumption need not suffer as a result. In that position they have been soundly supported by a report to the President, by Gano Dunn.

"There can not be one among you who has any question about enough steel for all defense or military needs. Your industry can match ton for ton all the steel capacity in Germany and its stolen lands, and still give civilians as much as their average consumption over the last ten years. The whole issue of enough steel rises over those civilian demands, which, the expansionists argue, must be met to the last ingot.



. . . . *William T. Holloway, chairman, Wheeling Steel Co.; Tom M. Girdler, chairman, Republic Steel Corp.; L. E. Block, chairman executive committee Inland Steel Co.*

"The reasoning of the advocates of forced expansion of steel making capacity has been based on a theoretical approach to the question. They see an endless procession of hypothetical dollars laden with imaginary demands. Estimates of probable future national income are used by them as the basis from which to calculate the likely civilian demand for steel. By that method they profess to find civilian demands in 1942, the probable peak year, mounting to the fantastic figure of 86 million tons of ingots. On various grounds one may challenge the soundness of any such theory.

"In the first place, experience does not show that the demand for different classes of steel products always varies in the same way with changes in the total of national income. There is no sound basis for comparing conditions which prevailed in the peaceful years of the past with the present wartime distorted conditions of the whole world.

"In the second place, what is this civilian demand that will work such magic in markets for steel? Who are those that will make this approaching paradise of buying? Certainly it is not the corporations, abraded as they will be between the nether stone of rising costs and the upper stone of frozen prices. It cannot be the salaried people, or those of fixed incomes, who already hear the ominous tread of the tax collector. Are the wage earners to need so

. . . . *Frank Purnell, president, Youngstown Sheet & Tube Co.; and Walter Tower, president, American Iron and Steel Institute.*

much more steel? Even prodigious numbers of automobiles, refrigerators, washing machines and the like would hardly make a dent in 86 million tons of ingots. I question whether industrial facilities are geared up to consume steel on any such scale. And it is also well to remember that boom markets for consumers' durable goods are always uncertain.

"Representatives of the industry, on the other hand, have come at the question from the basis of fact and experience. They start with what they know or can find out in respect to needs of our own defense program, the practical requirements of British and other essential export markets, the likely demand from reasonable civilian uses in this country. For defense, British and export, the facts at hand, treated most liberally, indicate a total of less than 30 million tons of ingots in 1942. Even as the industry stands today, that would leave more for civilians than they have ever needed in any year so far.

"In considering ability to meet those requirements, members of the industry also take into account that some expansion of capacity is always going on in the steel industry. As a result of the normal policy of repairs and replacements, the figure reported at the end of one year generally is increased in the course of the following year. Thus it is expected that upward of three million tons of ingot capacity will be added this year to the 84,000,000 which was reported last December. And next year likewise more can be expected to follow.

"Any effort to force the rate of expansion of steel making capacity to the extent of even 10 million tons per year probably could not be realized under two years, by which time, it is reasonable to expect, the critical emergency will have been met or passed. Even to do the job within two years would call for diverting labor, materials, equipment from other lines essential to the defense program, in order to provide plant facilities for tonnages of steel, needed, if at all, only for a boom-time spurt of civilian demand for non-defense products.

"It just does not make sense to urge such a course when men and materials, money and management are needed for a supreme effort to produce armament.

"Nor does it make any more sense to urge addition of new capacity when there is no firm public policy to insure that there shall not be any interference with the full use of existing capacity.

"Steel makers are confident that the matter of guns and butter or in its other variation more business than usual will quickly answer itself so far as civilian demands are concerned. Such ideas come from the unsound theory of war without sacrifice. Steel men know from the past that a policy of all-out defense must be more than mere words. It must face frankly the full extent of sacrifice that this job will require. Cumulative forces will pile up to add to the restrictive effects of rising taxes and morally forced savings. Short supplies of basic raw materials, like nickel; use of plant capacities in various industries to make war products; diversion of skilled labor into the great new armament industry; higher prices for many consumer goods; tighter control of ships, tools, etc.; regulation of the flow of capital; all these and probably other causes will work toward the end of restraining civilian demands. Industry in general can not do the job which is now being laid out, and still keep any semblance of business as usual.

"It is for these reasons that members of the steel industry have felt sound in their position that any forced or abnormal rate of expansion of steelmaking capacity is not now needed or justified.

"It is probably necessary to

. . . .Another Baruch. . . .

• • • Many steel leaders in New York last week for the American Iron and Steel Institute's annual meeting are looking for another Barney Baruch* to head up the national defense program.

Gearing up of the defense program under a strong man, with full responsibility and full powers to take drastic steps needed to hasten production of war materials, is necessary if the defense program is to reach all its objectives, they say.

Such a "bulldozer of inertia" at Washington would find support from all sections of industry and the dream of making the United States an "Arsenal of Democracy" would quickly become reality.

A poll of steel manufacturers in various Institute meetings disclosed only one man who said, the first step in speeding the defense production should be "to deport Phil Murray," CIO president.

Other steel men would, however, "freeze labor" where it is as the first step to streamlining defense. One said he could see no use in talking about shortages when scores of strikes, many too small to get much attention in the newspapers, were crippling defense production.

The government is not taking the job of preparing the nation for all-out defense seriously, another steel man said. "That's why there is so much fumbling at Washington." The greatest weakness in the U. S. defense program is lack of a master plan telling how and what the U. S. intend to defend, and when and what its war industries are to produce.

One Midwest steel manufacturer said that the defense program, is something that the public is not yet sold on as necessary for the preservation of the United States and its way of life. Yet there are groups, he said, that apparently believe in the defense program as a movement out of which industry can be nationalized and other changes in the social order be brought about.

Most of the steel executives questioned said they believed the steel industry is doing a good job on defense.

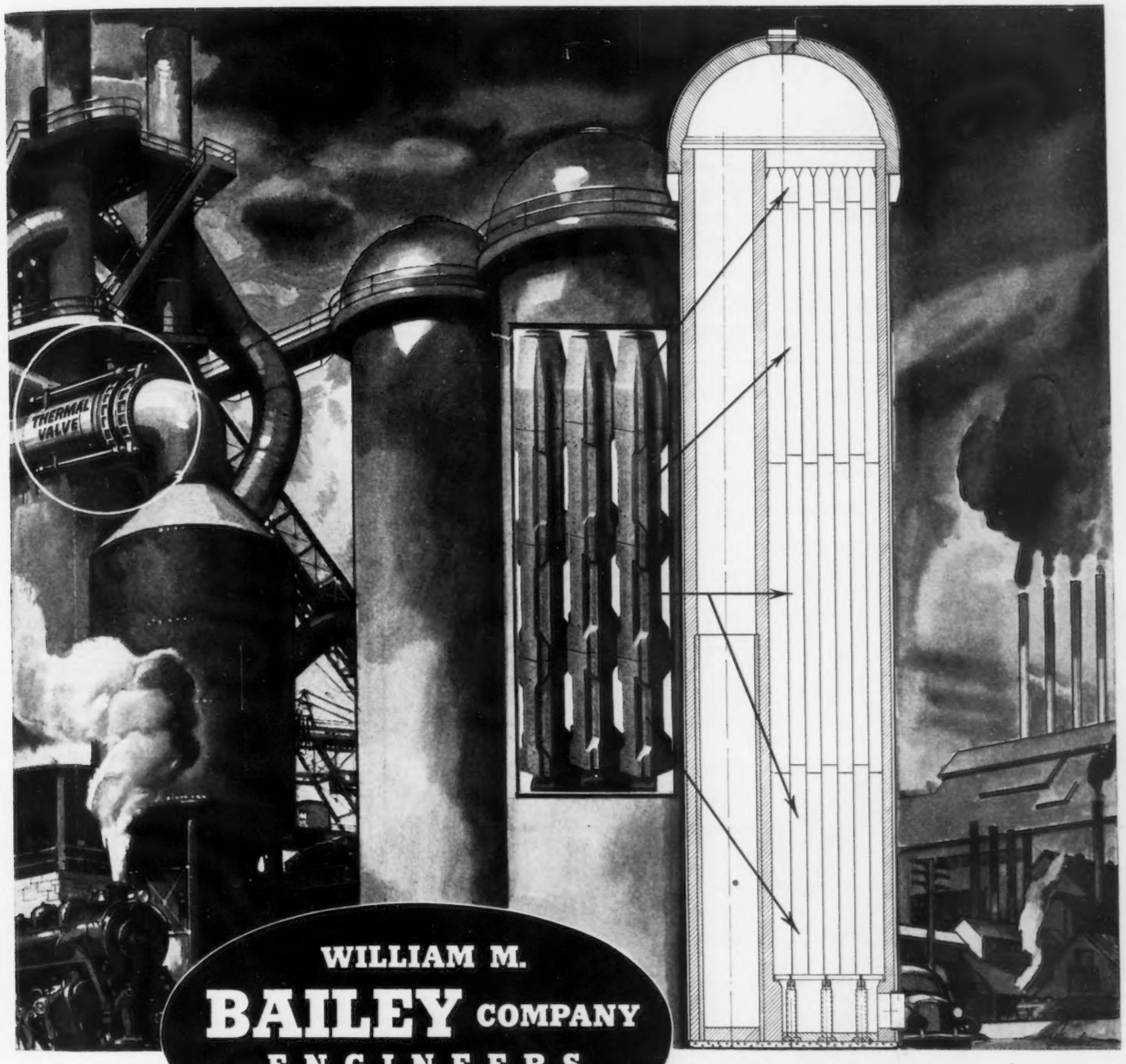
The labor problem, brought to the fore by recent National Labor Board plant, elections, soon will be handed over to the government and the public for settlement, another steel man said.

Activity of the Labor Board and of other government agencies have crippled attempts by independent unions in favor of a labor monopoly such as the CIO. Government sponsorship of labor unions must result in government control of unions, he said.

*Bernard Mannes Baruch, now 71, served as chairman of the War Industries Board in the first World War, following his appointment March 5, 1918, by President Wilson. In the last war it took almost a year to "get a Baruch," since the U. S. entered the war on April 6, 1917.

QUALITY IS TO A PRODUCT--- WHAT CHARACTER IS TO A MAN

Efficient Operation of the Blast Furnace Stoves depends on the quality of the Checker and Stove Design. The Open Joint Checker Shapes have proven the correct design to produce the highest efficiency in stove operation.



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The Open Joint Checker is the only checker shape that positively equalizes the flow of gases throughout the entire checker chamber, due to complete cross-circulation. The side passages from each flue have a greater area than the flue itself — therefore, the gases must flow across the entire checker chamber as well as through the vertical flues, causing maximum turbulence and, — therefore, maximum efficiency. Maximum stability in construction — due to column design of brick and method of piling and locking each brick horizontally and vertically in position. Maximum brick weight in hot zone of stove.

recognize that active participation in the war would be promptly accompanied by a general system of priorities and allocations on steel products. I hope, however, that if and when any such step becomes necessary, the full cooperation of members of the industry will be sought, in order to make the system work with a minimum of disturbing influences and no loss of efficiency on the part of producers. Only in that way will it be possible to do the best and the most that can be done.

"In the minds of many, the question of steel capacity to meet requirements is less important than the possible hampering effects on production from other directions. Thus, the lack of essential materials or the intrusion of labor difficulties could seriously curtail the output of steel, irrespective of what the available capacity may be. Fortunately, there have been no general nor protracted labor difficulties in the steel industry itself, but we have seen lately the serious threat to the industry's operations from the shut down of the soft coal mines.

"Real concern has been felt in some quarters lest available shipping facilities prove inadequate to transport the necessary tonnage of Lake Superior iron ore to support maximum output of existing blast furnaces. I question whether such concern is well founded. Likewise, there are misgivings in respect to the quantity of scrap that may be forthcoming, under the restrictive price controls which have been applied to that material.

"Given conditions which permit of operations, uninterrupted by forces over which the industry has no control, the producers of iron and steel can assure the nation that its every defense requirement for those products will be fully met. But it has no substitute for output which is lost because of strikes or shortages of essential materials.

"I have referred to the fortunate circumstance of general labor peace in the industry. That, it must be admitted, is the result of concessions which, if carried further, might lead to serious consequences. The recent advance of wages by 10c. an hour has brought the hourly wage level in the industry approximately to 50

. . . Sir Gerald Campbell: "It is productive capacity that will decide the issue in the long run."

per cent above the 1929 level, while prices are barely 2 per cent over the 1929 base.

"Wages constitute an important factor of steel making costs, and there is an inseparable relationship between costs and prices. If costs are forced up and prices remain stationary, profits shrink or disappear. Profits which remain in the hands of a steel company represent at best a very small part of the price received for its products.

"According to reports, the higher wage cost confronts a good many steel companies with the prospect of operating at a loss or at drastically sub-normal profits for the current scale of activity, unless there is some price adjustment. Such a condition is serious enough at any time. Ob-

viously production, not profit, is now the first consideration of the industry. But prices are important in production as well as in consumption.

"For many month.. the steel industry has stood out conspicuously as an important influence in maintaining a relatively stable condition of prices for industrial commodities in this country. It was a part of the far-sighted wisdom of steel makers that their prices were not raised, in spite of a record-breaking level of demand, accompanied by clamor for prompt delivery on large tonnages of their products. By following such a policy, members of the steel industry contributed to the general stability of prices in many other lines.

"I believe that there is every sympathy in the industry for a national policy which seeks to avoid inflation; that the industry realizes steel is the most widely used material, and that the price of steel affects a wide variety of industrial products. But steel prices do not exist in a vacuum. Price inflation can not be successfully avoided by putting a ceiling on steel prices alone, while wages, coal prices and other cost factors push steadily upward. Other important elements in the economic scheme must be brought under control, and maladjustments leveled out, if our national economy is to be kept on an even keel.

"It may be that price inflation is an inescapable and ultimate aspect of the sort of experience which we are facing. I do not pretend to know whether the action of any industry or of any public agency can deflect or check the force of such powerful economic currents as those which have been set in motion. But I do know, and all of you know, that the violent upthrust of sharply increased wages can not indefinitely be cushioned in the thin margin of profit.

"It is axiomatic that an industry to maintain itself efficiently must have a fair profit. Any price policy, be it private or public, which does not provide for a continuing fair profit is economically unsound and not in the public interest. Can it be that behind the screen of emergency regulations the already dwindling profit margin, that last shrinking vestige of private enterprise, is to be wiped out?

CARTRIDGE CATCHER: When this Dutch air-gunner, fighting with British forces, fires his gun, a bag catches the empty cartridge, saving the metal.

"Members of the steel industry must clearly recognize the possible far-reaching consequences of the steps which recently have been taken. Let no one pretend that the flames of inflation can be controlled solely by blowing away the smoke of some higher prices. It may not be too late, now, to check or prevent entirely the fatal sequence of spirally rising costs and prices. The members of this industry should take every precaution that their policies shall not bring upon the industry the charge of having been an active agent in promoting disastrous inflation.

"It should be hardly necessary to remind anyone that the cost of the defense program as outlined so far—and the end is not yet in sight—is a staggering sum. The program is already huge; it seems bound to get bigger. The foundation of that program is steel: steel for the Navy, steel for the Army, steel for ships, steel for Britain under the lease-lend plan, steel for new factories, and for a multitude of war products which they will be called upon to make. Any increase in the price of steel must add to that extent to the financial burden of defense.

"It may be that the defense program and the part which this in-

dustry plays in it should not be judged in terms of dollar costs, but only in accomplishment, and especially in the time within which things can be done. Too often, however, observers of the defense program fail to distinguish the difference between a dollar sign on an appropriation bill and a milestone on the tough road of actual production.

"We are told that the total contracts placed and appropriations authorized now exceed 40 billions of dollars. It is also said that that sum is to be spent before the end of 1942. With some justifiable skepticism on the latter point, because the value of contracts already placed is still but little above one-third of the total, it nevertheless is true that the planned expenditures are beyond any ordinary person's comprehension. They will involve disarrangements of industrial and economic relationships to an extent which is hard to foresee. In order to put the program through, a lot of industrial equipment and much skilled labor will have to be diverted from making goods for civilian uses. Your normal commercial relationships are bound to be distorted. Their protection, like every other consideration, must be secondary to the defense job.

"War can not be waged without sacrifice. There will be more, not less, interference with your accustomed ways of doing business. With war here, individual rights are likely to be curtailed. More government controls will be imposed on industry. Debts and taxes will continue their ruinous race. It will test your ingenuity to keep costs down. It will try your patience to keep markets orderly, to check hoarding and to hold production at top levels."

Outlining a program for "a new world comity of nations," Sir Gerald Campbell, British minister to the United States, the guest speaker at the institute dinner, said that the basic principles on which any peace settlement must be founded are: First, a system of security that will insure international stability; second, a system of economic collaboration that will render impossible the economic conflict between the democracies and will avoid the creation of autarchic totalitarian states; third, a system of ordered change

Music in the Air Lifts Republic Plane Output

• • • Weekly lunch hour concerts of popular and semi-classical music and group singing, held in the outdoor courtyard of the Republic Aviation Corp. plant at Farmingdale, N. Y., are credited by plant officials as morale builders in increasing the production of P-43 Lancer and P-47 Thunderbolt pursuit planes for the Army Air Corps. Philip R. Shays, personnel director, reports the change from noisy machinery to the open air music, produced by a WPA symphony orchestra, benefits the employees.

in the relationship between states that will restore confidence in the integrity of the word of nations.

"Will not the vigorous, young and virile United States accept the challenge implicit in this task and play its part?" he asked. "The new order in international relations," he said, "will be vitally dependent on the new order which will inevitably be established within the nations themselves, and nowhere will this be more apparent than in Britain, where stupendous changes are already taking form.

"Perhaps the greatest error of the last war in national politics was the hope and expectation of the vast majority, in Britain and elsewhere, to 'get back to pre-war' when it was all over. This time that cannot happen. The man on the street in Britain realizes that this is his war. The condition of Britain after the war is going to be his too. A new order is on the march in my country, a new order of which Adolph Hitler could not conceive. It is born of common danger, common suffering and common friendliness. It is born in the air raid shelters and in the fighting squadrons of the R.A.F. The flame of our common effort has burned away the barriers of class and caste which have so complicated the pattern of our social life, and has left us a people united as never before. The object of our new ideal is the welfare of the citizen, not the glory of the State."

Sir Gerald said that the steel industry represents "the hard core of this country's unparalleled effort to become an Arsenal for

Democracy" and that it is on the success of industry's efforts that the future of civilization largely rests.

"A favorite theme of the German propagandists," he said, "is the myth of German invincibility. We know that to be a myth. We know that the amazing successes of the German armies to date have been due to overwhelming superiority in equipment."

Earle C. Smith, chief metallurgist of the Republic Steel Corp., was awarded the American Iron and Steel Institute medal in recognition of his paper read at the 1940 meeting on "The Control of Steel Composition and the Problems It Presents."

In addition to the general meeting there were two sessions, one devoted to technical discussions and the other to industrial relations.

Blaw-Knox Buys C-I Plant for Ordnance

Pittsburgh

• • • **Blaw-Knox Co. has** arranged to purchase the Laughlin works, Carnegie-Illinois Steel Corp., located at Martins Ferry, Ohio, about 60 miles from here. The plant, which ceased operation as a tin mill early in 1940, will be rehabilitated for ordnance materiel manufacture. Operations will be directed by Lawrence E. Joseph, vice-president in charge of the company's Blaw-Knox division, with Louis C. Edgar, Jr., as superintendent.

W. P. Witherow, president of Blaw-Knox Co., commented, "With extensive additions already made to the company's six plants in Pittsburgh, further additional facilities were required to meet wider participation in the defense program. A complete survey was made of available and suitable plants in the Pittsburgh area, and we were fortunate to find a plant ready for occupancy within close proximity to Pittsburgh which suits the immediate purposes of national defense."

Du Pont to Build New Synthetic Rubber Plant

• • • **A new neoprene** synthetic rubber plant at Louisville, Kentucky, to be built, financed and operated by E. I. du Pont de Nemours & Co., has been announced by W. S. Carpenter, Jr., president of the company. Construction will begin immediately.

The capacity of the new plant, 10,000 long tons a year, exceeds the present total combined production of all synthetic rubbers. Neoprene is the only non-metallic substance on the government's mandatory priority list.

Empire at 5-Year Peak

Mansfield, Ohio

• • • **Empire Sheet & Tin Plate** Co. here is operating at a five-year peak according to President James M. Hill. J. B. Montgomery had been made a director while Oliver C. Henkel becomes secretary as well as treasurer of the company.

The high quality of Cramp products is due to sound engineering practice, correct materials, and the trained craftsmanship which enters into every step in manufacture.

For more than half a century Cramp has served American industry.

Today, Cramp's products include: castings and forgings of Parsons' Manganese Bronze and P. M. G. Metal; Parsons' White Brass; Solder; and miscellaneous castings and forgings of iron and non-ferrous alloys.

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THE MIDVALE COMPANY • STANDARD STEEL WORKS DIVISION

"Industry Must Speed Up"

—Wesson

Pittsburgh

• • • **The tempo of steel** and other industries must be stepped up because our ordnance requirements are continually increasing, Maj. Gen. Charles M. Wesson, chief of ordnance, U. S. Army, told Army officers and executives at the annual meeting of the Railway Club of Pittsburgh and the Pittsburgh Post, Army Ordnance Association, here last week.

"We are in the midst of trebling our best previous efforts for the production of smokeless powder. Our need for machine guns now is five times what we originally thought it would be. Where we had hoped to produce one tank, we must now produce four. That is a requirement which calls for greater ingenuity than we have ever shown before, but it is a requirement in which I am confident the steel industry of the United States will not be found wanting," General Wesson said.

General Wesson did not quote actual production figures but, compared to a year ago, he said, tank production was up 600 per cent, small arms ammunition 1200 per cent, powder 1000 per cent, shoulder rifles 360 per cent, machine guns 400 per cent. He also warned that as these figures increase and as new production comes along, there will be increasing need for more and more steel which would be true not alone of metal for defensive armament but equally for defensive equipment.

When the present phase of defense is over, the plants, equipment, knowledge and experience should not be discarded or allowed to deteriorate as they were following the last war, but should be kept rolling and in reasonable shape to avoid the necessity of spending billions of dollars at some future date, as we are now doing, Lt. Col. L. A. Codd, executive vice-president, Army Ordnance Association, said. Praising the progress of industry so far and predicting that ordnance and defense production will soon be at a much greater rate, Col. Codd said the most important thing was to maintain without fail the gains which have been made and which will be made in the near future.

Strikes as a whole, particularly the smaller ones which generally escape public notice, have proved a serious obstacle to the national defense program, E. F. Johnson, chief, Aircraft, Ordnance, and Tools, OPM, said during a tour with War Department officials for an inspection of shell and gun manufacturing operations.

"While on the surface the smaller strikes appear to be insignificant, actually they can stop production all along the line by withholding vital materials from other defense plants," Mr. Johnson said, and added, "When 10,000 men lose an eight-hour day, 80,000 man hours are lost to the defense program, never to be regained."

High ranking War Department officials and Pittsburgh executives inspected National Tube's Christy Park Works, where shells and bombs are being manufactured, visited Mesta Machine Co. which is preparing to turn out huge gun barrels, and wound up the defense tour at National Supply Co.'s Ambridge plant, where defense work is in progress.

Other speakers at the dinner meeting included Brigadier General Benedict Crowell, assistant secretary of war and director of munitions, 1917-1918 and president, Army Ordnance Association; Frank B. Bell, chief, Pittsburgh Ordnance district and president, Edgewater Steel Co.; J. W. Johnson, president, Railway Club of Pittsburgh, and John J. McCloy, assistant secretary of war.

END OF AN ERA? When the United Automobile Workers union (CIO) won a Labor Board supervised election last week at Ford Motor Co. plants, R. J. Thomas, UAW president, said the result "was the end of an era in American industry." Harry Bennett, Ford personnel director, said the election was "a great victory for the Communist party, Gov. Murray D. Van Waggoner of Michigan, and the NLRB. The law provides that we must live with them and we never violate the law." (Election results: Rouge plant, UAW, 51,866, AFL, 20,364; Lincoln plant, UAW, 2008, AFL, 587. *Photo by Wide World*

Blueprint Reading Handbook

Detroit

• • • **A "Blueprint Reading Handbook"** has been written and published by George Boland, chief tool engineer of Eureka Vacuum Cleaner Co., Detroit. It contains 78 pages and is intended for instruction of students and new workmen.

5 Years of Arming Ahead, G-E Chairman Tells U.S. Industry

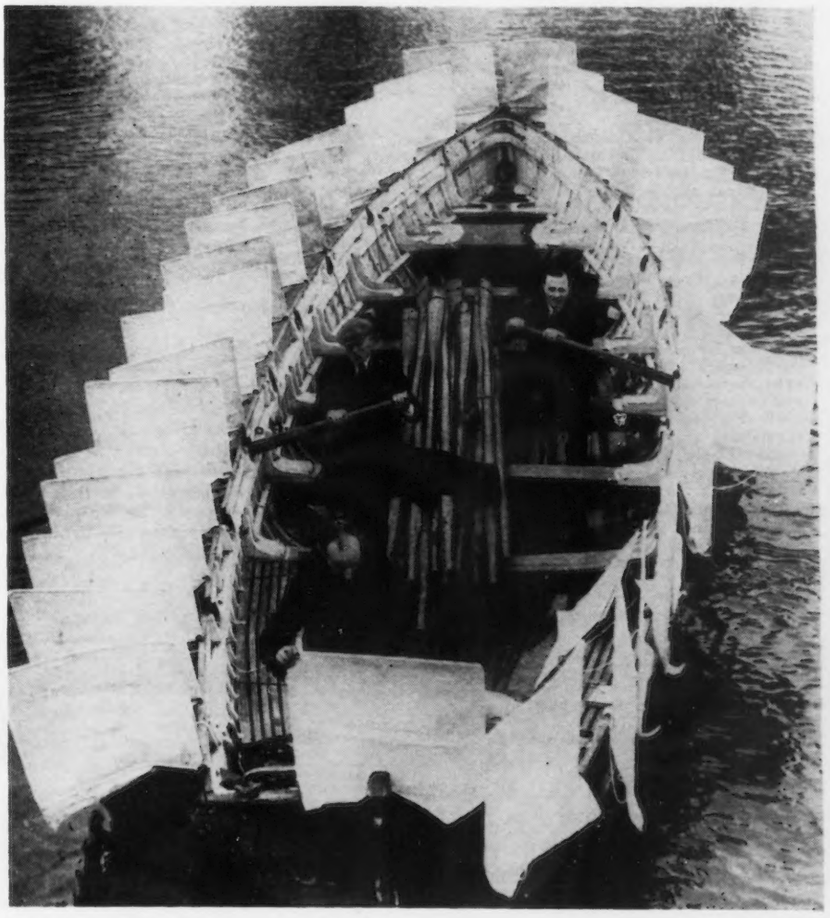
• • • Nondefense industries must plan for "a period not of months but of years" to get along with much less than their requirements in a long list of strategic materials, Philip D. Reed, chairman of the board of the General Electric Co., said May 22 at the 25th annual meeting of the National Industrial Conference Board at New York.

Mr. Reed, who for three months has been senior consultant to the OPM Director of Priorities, said that: "Prime emphasis will be placed on military products for five or more years. The sooner we accept the fact, for purposes of planning, that we face a long period of enormous production for defense, with a consequent shortage, rationing and allocation of strategic materials, the more quickly will nondefense industries adjust themselves to the new conditions and undertake the great task of maintaining maximum production for civilian needs without interference with defense output," he said.

SHELL FORGINGS: Shown here are (left to right), W. T. Mahla, general superintendent, National Tube Co.'s Christy Park Works; Maj. Gen. Charles M. Wesson, Ordnance chief, and B. F. Harris, president, National Tube Co., examining shell forgings during a defense plant tour at Pittsburgh.

* * *

SAILS AND FIRE SHIELDS: With German submarines centering their attacks in the Battle of the Atlantic on British oil tankers, steps are being taken to cut down such losses in ships and crews. This unusual tanker lifeboat shows asbestos screens which can be used as (1) sails to help the oarsmen or (2) closed shields to keep off the flames from burning oil. *Photo by British-Combine*



Aetna-Standard Speeds Gun Parts Output 50%

Youngstown, Ohio

• • • **Aetna-Standard Engineering** Co. is speeding up the rate of production of 37 mm. anti-aircraft gun carriages at its Ellwood City, Pa., plant by 50 per cent.

Aetna-Standard, which produced the initial gun carriage in the latter part of March, two months ahead of schedule time, is expected to more than keep ahead of this advanced schedule.

Sheet & Tube Get Copies Of Espionage, Sabotage Laws

• • • **Youngstown Sheet & Tube** Co.'s employees' publication, *The Bulletin*, this week reprinted sections of U. S. sabotage and espionage laws. "The cooperation of every person connected with this plant is essential in safeguarding government material and information," the company announced. "It is therefore essential that every employee be acquainted with the provisions of these laws."

Government Awards . . .

Navy Dept., Bureau of Supplies and Accounts:

Ajax Metal Co., Philadelphia; copper, phosphor, grades A and B $12,279

Aircraft & Diesel Equipment Corp., Chicago; equipment, Adeco fuel injection 66,048

Allegheny Ludlum Steel Corp., Brackenridge, Pa.; steel, plates, bar, welding quality sheets and angles 279,532

Aluminum Co. of America, Washington; alloy, aluminum, ingot. 61,950

Aluminum Cooking Utensil Co., New Kensington, Pa.; milk cans, fruit juice extractors, pots 22,666

Aluminum Goods Mfg. Co., Manitowoc, Wis.; trays and tea kettles 11,348

Aluminum Products Co., La Grange, Ill.; pots and pans, coffee boilers 189,125

American Brass Co., Waterbury, Conn.; copper, hard, drawn, bar, round 39,565

American Metal Co., Ltd., New York; zinc, slab 15,220

American Smelting & Refining Co., New York; zinc, slab, grade E. 28,240

American Tool Works Co., Cincinnati; lathes 588,870

Anaconda Sales Co., New York; zinc, slab 33,000

Baldt Anchor Chain & Forge Co., Chester, Pa.; anchors, stockless 7,256

Bay City Shovels, Inc., Bay City, Mich.; crane, mobile 6,600

Central Iron & Steel Co., Harrisburg; steel, plate, marine boiler 15,159

Circle Wire & Cable Corp., Maspeth, L. I., N. Y.; cable 9,341

Coates Electric Mfg. Co., Seattle; ovens, electric with spare parts. 5,728

Congdon & Carpenter Co., Providence; drills, twist, carbon steel 17,897

Crane Co., Washington; valves, steel, cast, angle and horizontal 321,312

Crescent Insulated Wire & Cable Co., Trenton, N. J.; cable, electric 48,221

Crucible Steel Co. of America, New York; steel, billets or bars nickel 47,142

Durabilt Steel Locker Co., Aurora, Ill.; metal clothes lockers 31,846

Equipment & Furniture Corp., New York; cabinets, wardrobe, metal 56,420

Everite Pump & Mfg. Co., Inc., Lancaster, Pa.; tubes, steel ... 550,930

Expert Sheet Metal Works, Brooklyn; pipe stack for gas fired boilers 970

Fairbanks, Morse & Co., Chicago; parts, spare 17,148

Flexitallic Gasket Co., Camden, N. J.; gaskets 26,948

Garlock Packing Co., Palmyra, N. J.; gaskets 37,923

General Electric Supply Corp., Washington; holders, pendant, lamp 6,200

General Motors Corp., Cleveland Diesel Engine Div., Cleveland; five sets of propelling machinery and spare parts for auxiliary vessels 631,500

General Motors Overseas Operations, New York; generators and control cabinets 76,498

Harnischfeger Corp., Milwaukee; four ten-ton, one 15-ton, and eight 5-ton bridge cranes 176,830

Illinois Zinc Co., New York; zinc, plates 73,528

International Minerals & Metals Corp., New York; zinc, slab, grade B 203,000

International Silver Co., Meriden, Conn.; silver-plated ware 546,000
forks and tableware, C-R steel. 130,076

Jeffrey Mfg. Co., Columbus, Ohio; chains and sprockets 27,030

Jessop Steel Co., Washington, Pa.; steel, C-R, bar, welding quality. 37,781

Jones & Lamson Machine Co., Springfield, Vt.; lathe, turret .. 10,058

Kilgore Mfg. Co., International Flare-Signal Division, Tipp City, Ohio; cartridges, aircraft, engine starter 128,666

Landers, Frary & Clark, Washington; tubes, steel 92,745

R. K. LeBlond Machine Tool Co., Cincinnati; lathes, heavy duty.. 500,702

A. Lietz Co., San Francisco; protractors, metal 6,600

Lloyd & Arms, Inc., Philadelphia; lathes, engine, precision, geared head 22,437
drills, radial 18,287

Los Angeles Shipbuilding & Drydock Co., Los Angeles; additional plant facilities 2,237,000

Manning, Maxwell & Moore, Inc., Bridgeport; valves, steel, angle and horizontal 45,656

National Twist Drill & Tool Co., Detroit; drills, twist, high speed steel 175,765

New Jersey Zinc Sales Co., Inc., New York; zinc, slab 51,089

Okonite Co., Passaic, N. J.; cable, electric 12,549

L. Oppleman, Inc., New York; cases, navigators'; compasses and dividers 20,450

Peck, Stow & Wilcox Co., Southington, Conn.; machines, notching, grooving 8,462

Phelps Dodge Copper Products Corp., British American Tube Division, New York; pipe, brass, seamless 155,014

H. K. Porter Co., Inc., Pittsburgh; locomotives, diesel 50,118

John Reiner & Co., Inc., Long Island City, N. Y.; generator, diesel engine driven 5,526

Revere Copper & Brass, Inc., Baltimore; copper, sheet, one side trimmed 102,802

Rochester Ropes, Inc., Jamaica, N. Y.; cable, aircraft 27,597

Rockford Machine Tool Co., Rockford, Ill.; shapers, hydraulic ... 21,555

John A. Roebling's Sons Co., Trenton, N. J.; cable, electric 9,335

Rome Cable Corp., Rome, N. Y.; cable, electric 9,335

Rustless Iron & Steel Corp., Baltimore; steel, C-R, strip, bar, welding quality 46,953

Safe Parachute Jump Co., Hightstown, N. J.; jump, tower 62,357

William Scrimgeour, Washington; knives, table, grille 44,275

Seagrave Corp., Columbus, Ohio; engine, fire 7,000

Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., Muskegon, Mich.; two 15-ton bridge cranes 7,137

Shepard Elevator Co., Cincinnati; elevators 23,095

Southern Welding & Machine Co., Charlottesville, Va.; tubes, steel 254,089

Sperry Gyroscope Co., Inc., Brooklyn; special additional plant facilities 130,000

Caswell Strauss & Co., Inc., New York; tin, pig, grade A 290,808

B. F. Sturtevant Co., Boston; special additional plant facilities .. 36,000

Tex-ite Products Co., Brooklyn; compound, boiler 15,827

Thew Shovel Co., Lorain, Ohio; truck, crane, 16½-ton capacity. 14,475

Triumph Explosives, Inc., Elkton, Md.; cartridges, aircraft engine starter 102,730

United States Hoffman Machinery Corp., New York; tubes, aluminum, terminal 365,650

Universal Packing & Gasket Co., Houston, Texas; gaskets 14,746

Kelvin & Wilfrid O. White Co., Boston; chronometers 53,100

J. G. Wilson Corp., New York; steel doors, rolling 28,000

Woodward Wight & Co., Ltd., New Orleans; drills, twist, carbon steel 27,524

Wright Mfg. Division, American Chain & Cable Co., Inc., York, Pa.; 16 two-ton cranes 44,534

War Dept., Ordnance:

Alan Wood Steel Co., Mine Hill, N. J.; aggregate $7,200

Baldwin Locomotive Works, Baldwin-Southwark Div., Philadelphia; testing machines 5,335

W. F. & John Barnes Co., Rockford, Ill.; machines, drilling .. 7,796

Bay State Elevator Co., Springfield, Mass.; elevators, electric.. 7,488

Bendix Aviation Corp., Scintilla Magneto Division, Sidney, N. Y.; tank parts 5,449

E. W. Bliss Co., Toledo, Ohio; presses, cold nose 20,500

Carrier Corp., New York; air conditioning equipment 10,055

Ralph B. Carter Co., Hackensack, N. J.; chlorinators and equipment 6,381

Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; grinders, centerless 7,624
machines, milling 13,395

ANOTHER FIRST: This 155 mm. gun carriage, just produced by American Locomotive Co. at Dunkirk, N. Y., is the first such carriage built by private industry for the defense program. The carriage, built to support a 155 mm. gun and its recoil mechanism, is carried on an 8-wheel bogie. The trails are brought together and locked and fastened to a 2-wheel limber which forms a connection to the prime mover. When in firing position, the carriage bottom is lowered to the ground and the trails are spread and anchored. The carriage weighs 20,000 lb. To build it required 1500 drawings.

Backyard Machine Shops Aid Defense

Cleveland

• • • Some of the backyard machine shops here are adding extra shifts and working nights under the impetus of the national defense program.

These small independent shops, many of them family or neighborhood affairs such as can be found in every large industrial city, are doing all right financially, have no particular labor problems and no worry about over-expansion.

In a shed at the back of his lot, Fred Brewer and his son and four other men are making parts for Diesel engines. Steve Byuro with seven employees on two shifts is producing dies which are used for parts for British Vickers Aircraft. Charles Wasmer and his sons and daughters are machining Diesel parts. Shell fuse parts are being made by the Pritchard Engineering Co., which boasts 18 machines and is one of the largest of the small shops here. There are countless other vest-pocket plants doing varied work.

Buying a piece of second-hand machinery, reconditioning it and then obtaining work to take home at night from the shops where they were employed, is the usual story of the men founding these small establishments.

Colt's Patent Fire Arms Mfg. Co., Hartford; parts for machine gun 7,325
Continental Motors Corp., Muskegon, Mich.; tank parts 290,418
Cummings Machine Works, Boston; brackets, trunnion 6,664
Doehler Die Casting Co., Pottstown, Pa.; plugs 6,650
E. I. du Pont de Nemours & Co., Pompton Lakes Works, Pompton Lakes, N. J.; assys., detonator. 525,000
Eclipse Air Brush Co., Inc., Newark; machines, chain conveyor.. 22,847
Federal Tool Corp., Chicago; gages and checks 6,080
Charles Fischer Spring Co., Brooklyn; small arms materiel 12,850
Great Lakes Steel Corp., Ecorse, Detroit; steel 20,528
Harrisburg Steel Corp., Harrisburg, Pa.; bombs 3,224,000
Hendey Machine Co., Torrington, Conn.; shapers, motor driven .. 5,540
King Refrigerator Corp., Brooklyn; chests, steel 17,950
Lehigh Foundries, Inc., Easton, Pa.; plugs, base 22,165
Lincoln Engineering Co., St. Louis; equipment for tanks ... 5,623
Metal Products Co., Miami, Fla.; fuze 516,000
Midvale Co., Nicetown, Philadelphia; forgings 14,283
Morgan Machine Co., Rochester; machines, nailing, single groving and shook splicer 40,227
Norco Metal Products Co., Philadelphia; punches and dies 22,041
Northwest Tool & Engineering Co., Milwaukee; material for gages.. 7,131
Norton Co., Worcester; grinders. 20,682
Revere Copper & Brass, Inc., Baltimore; brass 49,116
Riehle Testing Machine Div., E. Moline, Ill.; testing machines .. 5,350
Roessler Machine Co., Elkins Park, Pa.; punches, vent 6,750
Sheffield Gage Corp., Dayton, Ohio; gages 12,040
Sipp-Eastwood Corp., Paterson, N. J.; machines, spinning 29,160
A. O. Smith Corp., Milwaukee; bombs 3,224,000
Standard Tube Co., Detroit; forgings 1,544,000
Steelblast Abrasives Co., Cleveland; steel grit 10,850
Stewart Warner Corp., Chicago; fuze 1,417,800
Suburban-Essex Machinists, Orange, N. J.; gages 5,983
Titan Metal Mfg. Co., Bellefonte, Pa.; rings 126,000
Tools & Gages, Inc., Cleveland; gages 20,143
Union Twist Drill Co., Athol, Mass.; tools, cutting 5,357
United-Carr Fastener Corp., Cambridge, Mass.; studs and washers 5,400
Veit & Young, Philadelphia; dies and punch plugs 28,656
tools 32,160
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; machines, assy. 14,500
Western Automatic Machine Screw Co., Elyria, Ohio; car and tank parts 22,720
Western Cartridge Co., Winchester Repeating Arms Co. Division, New Haven, Conn.; primers .. 47,355
White Motor Co., Cleveland; scout cars 164,904
engines 6,392
Worcester Stamped Metal Co., Worcester; cases, cartridge 7,645
Zimmerman Steel Co., Bettendorf, Iowa; castings, steel 92,507

War Dept., Other Agencies:

American Cable Div., American Chain & Cable Co., Inc., New York; swager assys. $55,000
Beach Aircraft Corp., Wichita, Kan.; airplanes and spare parts 6,171,660
S. Blickman, Inc., Weehawken, N. J.; cook's tables and coffee urns 46,415
Consolidated Aircraft Corp., San Diego, Cal.; turret assys. 345,369
Continental Motors Corp., Muskegon, Mich.; engines and spare parts 5,241,746
Evansville Metal Bed Co., Evansville, Ind.; hospital beds 30,936
J. W. Fiske Iron Works, Brooklyn; porch benches 9,420
Goodyear Tire & Rubber Co., Inc., Akron; wheel and brake assys.. 25,511
International Silver Co., New York; forks, knives and spoons. 189,507
Kermath Mfg. Co., Detroit; diesel marine engines 30,479
A. J. Miller Auto Cruiser Trailer Co., Bellefontaine, Ohio; trailers 5,707
Nash-Kelvinator Co., Detroit; propeller assys. and spare parts .. Indefinite
plant for mfg. propeller assys. 8,500,000
Ontario Knife Co., Franklinville, N. Y.; 33,442 each of boning, bread and butcher knives 13,464
O'Sullivan Rubber Co., Winchester, Va.; valves, outlet 21,000
Perfect Circle Co., Hagerstown, Ind.; machinery and equipment for production of aircraft piston rings 208,850
Salta Corp., Jersey City, N. J.; outlet valves 10,000

Harvester Gets Gun Order of $12 Million

St. Paul

• • • Intermediate - caliber artillery will be manufactured by International Harvester Co. here, bringing Harvester's total defense business to more than $40,000,000. A four-story building, originally erected as an assembly plant by the Willys-Overland Co., and for the past few years used by Harvester as a warehouse, will provide 300,000 sq. ft. of space for production of the gun. Harvester officials estimate 1500 men and women will be employed on the contract. Approximately $4,000,000 in machine tools and other equipment must be purchased for the initial order for $12,000,000.

John E. Harris, superintendent of the firm's Milwaukee works, will be in charge at St. Paul plant.

Prime Contractors Send Own Layout Men to Outside Plants

Pittsburgh

• • • Large manufacturing concerns with prime government contracts who have been subletting a considerable portion of the business, have found that in many instances completion of the work is expedited, waste is eliminated, and general efficiency is increased by sending representatives to the sub-contractors' plants in order to do layout work, etc.

One Midwestern plant having a large government contract is able to save considerable time and money by sending its layout man to a subcontractor's shop where the layout is performed on the spot, with the result that when it reaches the prime contractor's plant, everything is in order.

Skilled Workers Ordered Deferred in Illinois

• • • Paul Armstrong, Illinois state director of selective service, has ordered draft boards to defer skilled workers from army service by putting all men vital to industry in the class 2-A group if they had previously been classified as 1-A. This includes not only plant workers but students in technical schools and shop apprentices.

Keep Plants Ready After War, President Of Sheffield Urges

• • • **Industry must not** weaken the security of the United States when peace comes by "scrapping the work that is being done today," Louis Poock, president and general manager of the Sheffield Corp., declared recently at the opening of the company's new $1,000,000 plant addition at Dayton, Ohio.

"The peace we all want will come again, and with it possibly a desire to again shut our eyes to defense needs," Mr. Poock said. "That we must never do. Never again should we permit our country to seek or hold peace with weakened hands. Instead, we should make doubly sure our future peace with armed forces equal to our desire for lasting peace."

Opening of the new plant addition, which will manufacture gages of varying sizes and types for defense and commercial work throughout the country, brought many army and government officials to Dayton on May 16.

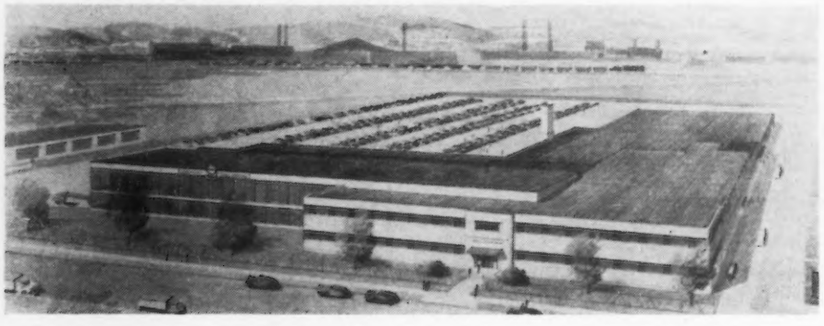
In an address at the dedication of the plant, Brig. Gen. S. M. Barnes, assistant chief of industrial service, Washington, declared that defense of the U. S. depends to a large degree on the zeal of American workmen. "We are inclined to forget that in the highly mechanized war they are waging they (German armed forces) must be backed up with equally fanatical zeal by the industrial workers who supply them with the tools of war. More people must become enthusiastic about defense if the national defense program is to succeed, Brig. Gen. Barnes said.

Brig. Gen. Barnes and other officers inspected the new plant and examined a new gage, called the precisionnaire, used for gaging of rifle barrels, guns and cannons, and has speeded production of shells.

The 80x240 ft. plant addition includes air-conditioned offices and an engineering department with air-raid protection facilities. It makes Sheffield the largest gage-making plant west of the Atlantic seaboard and the second largest in the world.

Sheffield Corp. was started 35 years ago as a small machine shop on the second floor of a building at Shawnee and Wyandotte Streets, Dayton, under the name of the City Machine & Tool Works, the beginning of what is now the Cimatool Co. The Sheffield Gage Corp. was begun in 1916. Recently the two companies were merged into the Sheffield Corp. with O. M. Poock as chairman and Louis Poock as president and general manager.

WHEN SHEFFIELD CORP. opened its new $1,000,000 plant addition at Dayton on May 16, many army officers were guests. Above (left to right), are Brig.-Gen. G. M. Barnes, assistant chief of industrial service; Louis Poock, president and general manager of Sheffield Corp.; Brig. Gen. W. P. Boatwright, commanding officer, Frankford Arsenal, Philadelphia; H. B. Hambleton, Ordnance Department; Col. W. S. Borden, assistant to General Barnes; Lieutenant R. Kramer, Ordnance Department, and Paul Poock, of Sheffield Corp. The men are examining the new Precisionaire gages used for inspecting gun barrels.



Ship Orders of $180 Million Placed in British Columbia

Toronto

• • • **Contracts have been** placed with shipbuilding companies in British Columbia for 100 merchant ships of the 9300-ton class, representing a total outlay of $180,560,000. The orders, distributed among five companies, will keep plants at capacity until the end of 1943. The ships will cost between $1,775,000 and $1,860,000 each. Recently British Columbia shipbuilders placed orders for 70,000 tons of ship plate with Ontario producers. Steel is beginning to arrive on the West Coast, and construction will be started immediately. The merchant ship orders have been awarded as follows: Burrard Drydock, Ltd., North Vancouver, 42; North Vancouver Ship Repairs, North Vancouver, 28; Victoria Machinery Depot, Victoria, 10; Yarrows Limited, Esquimalt, 10; Prince Rupert Drydock, Prince Rupert, 10. The orders were placed, and construction will be under the supervision of Wartime Merchant Shipping, Ltd., a government owned company, headed by H. R. MacMillan.

Ship Shortage Cuts Defense Stockpiles

Washington

• • • **OPM reported last week** that building up defense stockpiles to the extent orginally planned may prove impossible because of the expected inadequacy of shipping facilities. It made public the status of principal items called for under the stockpile program:

Chromite—Stockpile sufficient to supply industry for more than a year at the current rate of consumption. More has been ordered; domestic production is being encouraged.

Copper—Delivery of the first 100,000 tons being completed. Orders of considerable quantities have been placed with Chile.

Graphite — Adequate stockpile will supply industry nearly a year at present rate of consumption.

Manganese — Stockpiles sufficient to meet industrial needs for 16 months. Probably domestic production, plus expected Cuban deliveries, could supply industry through 1943.

Nickel—Current supplies low but defense requirements are assured. Most of world supply is in Canada.

Tin—Present stock expected to supply industry more than a year. Large tonnage have been ordered from China, and Bolivia is to deliver 18,000 tons a year for five years.

Tungsten—Stocks are low due largely to interruption of imports while the Burma Road was closed. While substitutes are being studied, domestic production is being stepped up in an effort to meet peacetime needs without imports.

Zinc—Shortages being met by partial priority control and expansion of existing plants. Domestic supply could be supplemented by purchases from other Western Hemisphere countries.

Rubber—Record imports have built sufficient reserves to last a year, but with conservation measures and increased reclamation, both of which are under study, the supply could be stretched to 18 months. Cotton in exchange for British rubber has helped build stockpile; synthetic production is increasing but is still insignificant.

Awards Are Made For Outstanding Steel Bridges

• • • **The 13th annual awards** for the most beautiful bridges built of steel during the past year were announced by the American Institute of Steel Construction at a dinner meeting of the Institute on May 21.

The most beautiful monumental bridge erected in the past year, Susquehanna River Bridge between Havre de Grace and Perryville, Md. Completed July 15, 1940, the bridge consists of 53 spans totalling 7618 ft., and cost $4,085,000. Engineers: J. E. Greiner Co. Fabricators: Bethlehem Steel Co.

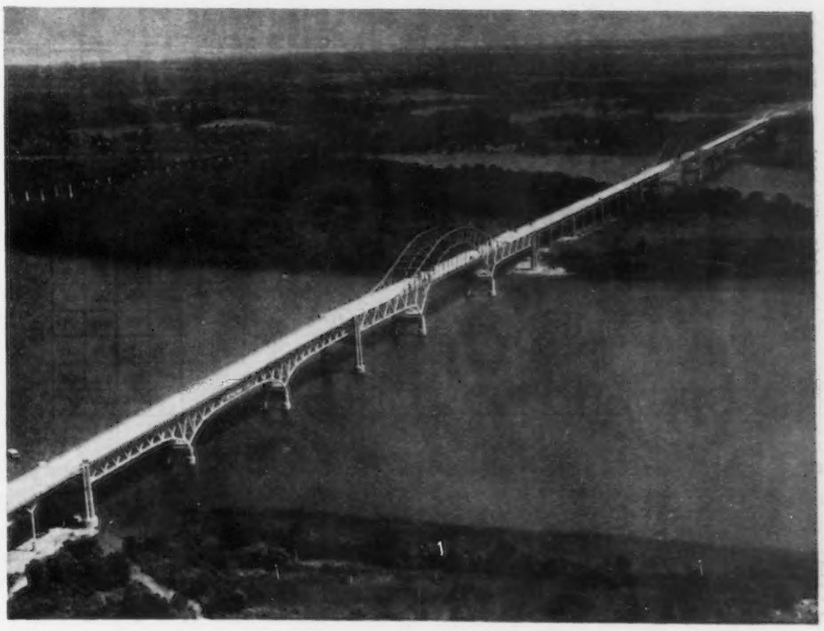
The Dunnings Creek Bridge on the Pennsylvania Turnpike won the Class B award for being the most beautiful medium-sized bridge. Completed in May, 1940, at a cost of $260,000, this bridge consists of 6 spans totalling 480 ft. Engineers: Parsons, Klapp, Brinckerhoff & Douglas. Fabricators: American Bridge Co.

Spanning the Klamath River at Orleans, Cal., is the Klamath River Bridge, completed Oct. 1, 1940, which won the first place Class C award for being the most beautiful small bridge. The main suspension span is 360 ft., and the total length of the bridge is 665 ft. Costing $139,900, this bridge was designed by C. H. Purcell, State Highway Engineer and, F. W. Panhorst, Bridge Engineer, of the Department of Public Works, State of California. Fabricators: Judson-Pacific Co.

The Oceanic Bridge, over the Navesink River between Locust Point and Rumson, N. J., was awarded the first prize for being the most beautiful movable bridge. Costing $1,030,000, the bridge was completed Oct. 1, 1940, and is 98 ft., from center to center of bearings. Engineers: Howard, Needles, Tammen & Bergendoff. Consultants: Morris Goodkind, Fabricators and Erectors: Bethlehem Steel Co.

Class A bridges, costing $1,000,000 or more, receiving honorable mention were the Ohio River Bridge at Owensboro, Ky., and the Pennsylvania Avenue Bridge at Washington, D. C. The Ohio River Bridge was fabricated by Hunter Steel Co., and the Pennsylvania Avenue Bridge by Bethlehem Steel Co.

MOST BEAUTIFUL: Winner of the American Institute of Steel Construction award for the most beautiful monumental bridge built in the U. S. in 1940, is the Susquehanna River Bridge between Havre de Grace and Perryville, Md. The structure, costing $4,085,000, was completed July 15, 1940. It has 53 spans of a total length of 7618 ft. abutment to abutment. Fabricator was Bethlehem Steel Co.; engineers, J. E. Greiner Co.



Carnotite Vanadium Ore Shipments 96,345 Tons in '40

Washington

• • • **Carnotite and vanadium** ores shipped for sale or used in making vanadium oxide amounted to 96,345 short tons containing 2,067,106 lb. of vanadium in 1940, according to the Bureau of Mines. In addition, 434 short tons of salts containing 23,495 lb. of vanadium, obtained as a byproduct of complex ores, were shipped last year. This total of 2,090,601 lb. of vanadium shipped or used in 1940 compared with 1,984,068 lb. in 1939.

The carnotite and vanadium ores came from several operations in Colorado and Utah, and complex ore carrying values in gold, silver, lead, molybdenum, and vanadium was produced in Arizona.

According to the Bureau of Foreign and Domestic Commerce, imports of vanadium ores were 22,551 net tons containing 2,574,951 lb. of vanadium in 1940 (15,694 tons of ore containing 2,132,548 lb. of vanadium in 1939). Imports of uranium ore were 2,400,198 lb. in 1940 (5 lb. in 1939); uranium oxide and salts of uranium were 240,199 lb. (1,439,342 lb. in 1939); and radium salts were 30.31 grams (78.63 grams in 1939).

Algoma Plans $5 Million Finishing Mill Expansion

Toronto

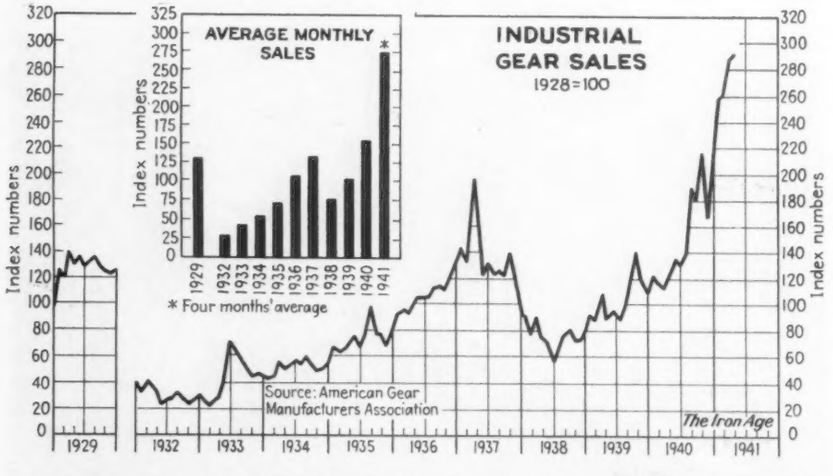
• • • **Algoma Steel Corp.,** Ltd., Sault Ste. Marie, Ont., plans a $5,000,000 plant expansion this year, to be financed largely by the Canadian government, enabling the corporation's finishing mills to handle 100 per cent of primary production instead of the present 60 per cent. The company's four blast furnaces have an annual capacity of 675,000 gross tons of pig iron; open-hearth capacity is 600,000 tons of steel ingots; coke ovens, 750,000 tons. The capacity of a 30,000 ton tin plate mill, installed in 1939, was doubled in 1940.

Bonus of Week's Pay For Stewart-Warner Employees

Chicago

• • • **A Bonus of one week's** pay will be distributed to Stewart-Warner Corp. employees on June 30. The announcement was simultaneous with payment of a 25c. dividend to stockholders. Employee payrolls averaged 30 per cent higher than last year before this distribution. The bonus will go to those with one year of uninterrupted service.

April Gear Sales Set Record



• • • **Rising pace of industrial activities is causing a tremendous demand for industrial gears An index of gear sales compiled by the American Gear Manufacturers Association reached 292 in April, setting a new record, the association reports. The index stood at 288 in March and 128 in April, 1940. For the first four months of this year sales have been running 130 per cent ahead of the comparable 1940 period.**

Muscle Shoals Aluminum Plant Begins Operation

• • • **Production of aluminum** has started at Muscle Shoals, Ala., according to R. S. Reynolds, president of the Reynolds Metals Co. First test runs in the Lister, Ala., aluminum plant of the Reynolds company were completed May 18, a day less than six months after the ground was broken for the factory. The Alabama plant produces alumina from bauxite, and further reduces the alumina to pure aluminum. When the plant is in full production which is expected to begin this July, it will turn out 40,000,000 lb. of pure aluminum each year.

The Reynolds company broke ground six weeks ago for a plant at Longview, Washington, where more than 60,000,000 lb. of aluminum will be produced annually with operation beginning in August.

Arnold's Assistant Joins Reynolds Metals Co.

• • • **Walter L. Rice,** who since 1930 has represented the Department of Justice in anti-trust cases involving the steel and other industries, has resigned as special assistant to Thurman Arnold, head of the anti-trust division, to become vice-president and general counsel of the Reynolds Metal Co.

Mr. Rice, a native of Minneapolis and graduate of Harvard Law School, also handled the NRA sick chicken case for the government in 1935. Prior to 1930 he was in the office of the district attorney in New York City. The Reynolds Metal Co. has aluminum plants under construction which are expected to have an annual capacity of 100,000,000 lbs.

Reynolds Metals Signs For Dutch Guiana Ore

• • • **Provision** for 6,000,000 tons of high grade bauxite (aluminum ore) for Reynolds Metals Co., was assured when 12-yr. contracts were signed this month by R. S. Reynolds, president of Reynolds Metals Co., and J. van den Broek, Managing Director of N. V. Billiton Maatschappij, owner of large tracts of the aluminum-bearing ore located in Surinam (Dutch Guiana).

Output of Vertical Shell Turning Machines Moves Up

Cleveland

• • • **Shipments of vertical** shell turning equipment to the General Motors forge plant, part of the Olds Motor Division at Lansing, Mich., are going forward steadily from the plant of the Cleveland Hobbing Machine Co. here. Three machines already are in operation, the first having been finished March 15 and a fourth was shipped last week.

The local company at present is completing one machine every ten days and hopes by July 1 to be on a one-a-week schedule.

Eight shells are turned out simultaneously by the machine, which is known as the "Rigid-turner." Tungsten carbide tools are used. According to W. H. Staples, vice-president and general manager of the Cleveland company, more than 4000 of the 75-mm. shells are now being turned out each day by the three machines operating at Lansing.

Butler Mfg. Co. To Build Round Steel Houses

Kansas City, Kan.

• • • **From corn cribs to houses** to solve the defense housing problem is the step the Butler Mfg. Co., here, will take. Makers of metal corn cribs, Butler plans mass production of prefabricated round steel structures to house eight persons and to sell for about $750 each. Each "house" will have 15 plastic skylights for sunrays and 10 portholes for vision and ventilation. Houses were designed by R. Buckminster Fuller, engineer and former technical editor of *Fortune* Magazine. Houses can be erected in three days by unskilled labor. E. E. Norquist, president of the Butler company, said his plants at Minneapolis and Galesburg, Ill., could produce 1000 houses a day.

Worthington Pump Gives Emblems to 2800 Employees

• • • **Worthington Pump** & Machinery Corp. has just distributed more than 2800 lapel emblems to employees who have completed five years or more of service.

Woman Operates School for Welding

Chicago

• • • **"Mother knows best" and "Mother is the boss" are strict rules at a Chicago welding school. "Mother" is Sarah Terpening, 40, who actually is the widowed mother of six children and a first class welder at the same time. Mrs. Terpening has operated her welding school since 1926 and has graduated more than 3000 trained men in that time. More than a score of welding superintendents in this area are graduates of her school.**

She learned her trade 17 years ago from her husband when an accident made him a semi-invalid.

Harnischfeger Fabricating Houses for Ship Workers

Milwaukee

• • • **To avoid high first** costs and subsequent low salvage value of government construction projects, the 400 homes being built by the Kroening Engineering Co., at Manitowoc, Wis., for shipyard workers will be constructed of steel and wood panel units which can be taken apart and used for any other types of buildings. The Kroening firm bid $2,995 per house and the building units are being fabricated at the Harnischfeger Corp. housing division, 4500 W. Mitchell St., Milwaukee.

SWOC Members Must Show Dues Books on Demand

• • • **Members of SWOC will** receive orders to carry their dues books at all times when dues inspection is resumed this month. This action, which will permit dues inspection within departments of steel plants in this district, is an innovation of union leaders here, following the plan started several months ago of stopping workers at the gates and refusing them admittance if they could not show their dues were paid. The new rule will probably start with the Chicago South works of Carnegie-Illinois Steel Corp. where the union is initiating another membership drive.

Decentralize Defense Output, Trundle Urges

Washington

• • • **Addressing the annual** spring conference of the Society for the Advancement of Management last Friday, President George T. Trundle of the Trundle Engineering Co., Cleveland, strongly urged decentralization by coordinating national defense production in each community to the facilities possessed by that community. Scattered throughout the country, he said, there exist hundreds and even thousands of smaller factories with equipment, trained men, and a reasonable amount of engineering skill ready to be put to work for national defense.

Mr. Trundle also proposed reorganization of district ordnance offices and methods of buying as an important step for speeding national defense, adding that the district offices need the complete cooperation of all the people within each district.

Mr. Trundle proposed that there be some one man available in every district who could make decisions as to the actual degree of accuracy and tolerances required on various operations, without delay.

Allegheny Ludlum Forms Own Strategic Materials Group

• • • **Allegheny Ludlum** Steel Corp. has announced formation of a committee for Conservation of Strategic Materials, which will act as a central clearing point for all of the company's technical activities on this currently vital subject. It includes V. B. Browne, vice-president in charge of research; C. A. Scharschu, director of research and metallurgy; and R. P. DeVries and W. R. Breeler, associate directors of research.

SWOC Reported Willing To Give Up Vacations

Gary, Ind.

• • • **Steel Workers'** Organizing Committee will cooperate with any plan that makes it necessary to cancel vacations this summer, Frank Grider, sub-district director of the CIO, said.

New Dunn Report Will Not Be Decisive, Roosevelt Indicates

Washington

• • • **The question of building** additional steel facilities on the West Coast is being held in abeyance by the Administration until a better picture of further needs is completed. Pending the completion of this picture no proposals are being turned down, no proposals are being accepted.

Briefly, that was President Roosevelt's reply last Friday when asked if he could confirm reports that the plan of Henry J. Kaiser, calling for new steel capacity of 1,250,000 tons annually in Utah, Oregon and California, had been turned down by the Office of Production Management.

Mr. Roosevelt indicated, too, that the latest revision of the Gano Dunn steel report, expected to be laid on his desk shortly, will not be decisive in the matter. He described the forthcoming report as only one of the elements involved, but did not identify the other elements he had in mind.

Earlier in the day, following the White House visit of OPM Director General William S. Knudsen, the report circulated in Washington that the Kaiser plan had been turned down by the OPM in favor of a program to expand existing steel facilities as and when needed. Both Mr. Knudsen and Federal Loan Administrator Jesse H. Jones recently expressed skepticisms of adding new steel facilities, both expressing the view that the country's present steel capacity is adequate.

At least once since the Dunn report was made public several months ago, the Chief Executive himself has minimized reports that there is a danger of a steel shortage.

Reminded at his press conference last Friday that in October, 1939, he had gone on record in favor of building Pacific Coast steel facilities, Mr. Roosevelt recalled his statement, observing that a great deal has been accomplished since that time. The aluminum and magnesium industries have established plants on the West Coast, he said, and existing steel plants have expanded capacity. Mr. Roosevelt said he had no information on the extent of this expansion. The President, however, described himself as still keen about the idea of building additional industrial facilities on the Pacific Coast and utilizing available electric power resources.

Mr. Roosevelt told a press conference in October, 1939, that additional industrial facilities in the far West, including steel mills, had been a hobby with him since 1913, that electric power from Bonneville and Grand Coulee Dams was cheap and plentiful, that such power was becoming increasingly important in the manufacture of steel. Since that time the Sierra Iron Co. of Nevada has signed a 20-year contract for Bonneville power and announced plans to build electric furnaces and a cast iron pipe plant at Vancouver, Wash. Production of 100 tons of pig iron a day by the end of 1940 with an ultimate daily output expected to reach 500 tons was planned.

80 Large Transport Planes Ordered From Lockheed

Chicago

• • • **Purchase of 80 new** four-engined transport planes from Lockheed Aircraft Corp. was announced here by Jack Frye, TWA president. Mr. Frye said his company would take 40 planes and that Pan-American Airways would take the same number.

The new planes are supposed to be larger and faster than any now in use. Cruising speeds will be 283 mph. Sixty-four passengers can be carried, and flying range will be 4000 mi. Top speed is estimated at 350 mph. First ship is already under construction and the priorities board has authorized construction of two more.

Correction

• • • **Dominion Steel & Coal** Corp. will increase ingot capacity at its Sydney, N. S., plants to 670,000 gross tons yearly, following signing of a contract with the Canadian Government. A news story in the May 22 issue of THE IRON AGE said incorrectly that the plant capacity would be increased by 670,000 gross tons.

Vancouver to Get New Rolling Mills

Ottawa

• • • **Dominion Bridge Co., which owns and operates steel fabricating facilities in the Vancouver, B. C., area, plans to move its furnaces and rolling mills from its Calgary plant, which has not been in operation for some time, to Vancouver.**

The Vancouver mill, rolling ship plates, will consume only the scrap available in those areas, namely British Columbia and Western Alberta, where it can be collected at an economic cost, and where dealers have been facing the problem of disposing of scrap which has been accumulating since the beginning of the war. The company already operates a similar mill in Manitoba.

First Powder Produced At Madison, Ind., Plant

Madison, Ind.

• • • **First smokeless** powder made at the new plant here has been tested and approved by the United States Army. A total of 21 charges from a 75 mm. field gun were made in the initial test, conducted on the 60,000-acre firing range connected with the plant. Firing was measured electrically as charges passed through two wire screens.

Fabricated Structural 211,301 Tons in April

• • • **New business booked** during April by the structural steel fabricating industry totaled 211,301 tons, the largest since January, when 281,235 tons was booked, according to reports received by the American Institute of Steel Construction. Business booked by this industry during the first four months of the year amounted to 872,167 tons, which is approximately 75 per cent of the business booked during the same period of 1929.

Shipments of finished work during April increased over the previous month and amounted to 176,594 tons. The business on hand scheduled for delivery within the next four months amounted to 741,882 tons on May 1.

Crosby Nominated Chairman Of Detroit Foundrymen

Detroit

• • • **V. A. Crosby,** Climax Molybdenum Co., Detroit, has been nominated chairman of the Detroit Chapter, American Foundrymen's Association for the 1941-42 term. Nominations for new chapter officers and directors were made at the May 22 meeting of the group. Installation will be at the annual business meeting in June. Other nominations include: vice-chairman, F. A. Melmoth, Detroit Steel Castings Co.; treasurer, W. W. Bowring, Frederic B. Stevens, Inc.; secretary, A. H. Allen, Penton Publishing Co. Directors are: for term expiring 1944—Glenn Coley, Detroit Edison Co.; Carl F. Joseph, Saginaw Malleable Division, General Motors Corp.; O. E. Sundstedt, General Foundry & Mfg. Co., and E. C. Hoenicke, Eaton-Erb Foundry Division, Eaton Mfg. Co.; for term expiring 1943—O. L. Allen, Pontiac Motor Division, General Motors Corp.; O. E. Goudy, Kelsey-Hayes Wheel Co.; E. L. Morrison, Budd Wheel Co., and H. W. Dietert, H. W. Dietert Co.; for term expiring 1942—A. J. Gonter, Dodge Division, Chrysler Corp.; R. G. McElwee, Vanadium Corp. of America; J. H. Crawley, American Foundry & Pattern Co. and W. B. McFerrin, Cadillac Motor Car Division, General Motors Corp.

English Technical Groups Meet, Thrive Despite War

• • • **A membership drop** of only 100, including removal of names of German and Italian members, was reported for the past year at the annual meeting of the British Institute of Metals, held recently in London. The Institute, which has 2237 members, presented its 1941 platinum medal to Dr. C. H. Desch, former president.

Membership in the Sheffield Metallurgical Association has increased considerably, with good attendance at the year's meetings.

The Birmingham Metallurgical Society, another technical body which has continued wartime functioning, was told by its president, C. H. H. Franklin, that Birmingham should display relics of its industrial growth.

Doubling of Buick Plane Engine Plant Considered

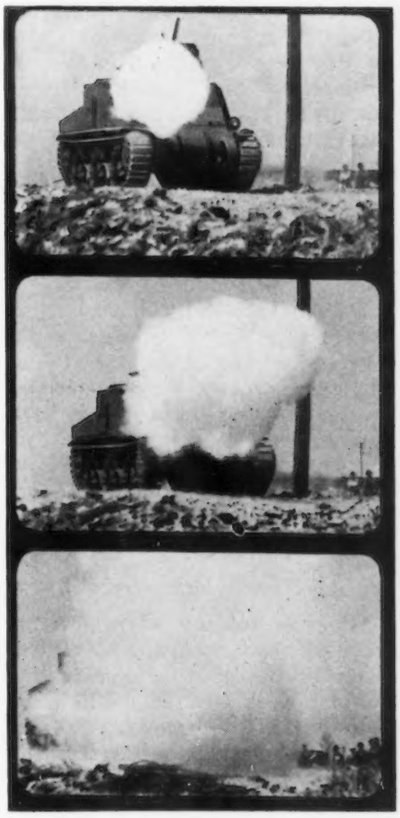
Chicago

• • • **Before the original** plant is completed, plans for expanding the new Buick aircraft factory here are already being discussed. According to the contractor, ground at the northern end of the plant is kept vacant to permit expansion in that direction. Expansion talk follows reports that the government has already asked Buick to double its originally planned output of 500 Pratt & Whitney 1200 hp. aircraft engines.

Definite decision to double number of original 24 engine testing cells has already been made. Each engine must run 48 hr. in the test cell before it is accepted.

About 90 per cent of the foundation work for the main manufacturing building and a substantial amount of steel work had been completed by mid-May.

SHOOTS AND HIDES: In a split second this charging M-3 28-ton tank, built at Chrysler's new tank arsenal near Detroit, has fired its 75 mm. gun and has almost disappeared behind the mushrooming smoke burst.



Justice Department, OPACS May Cooperate in Trust Cases

Washington

• • • **A working arrangement** between the Justice Department and the Office of Price Administration and Civilian Supply, which was announced recently by Attorney General Robert H. Jackson as equipping the OPACS with the Justice Department's enforcement machinery in "appropriate" cases, is held to mean cases involving possible anti-trust violations and not violations of price fixing schedules issued by OPACS. This interpretation is drawn from close examination of Mr. Jackson's letter to Leon Henderson, Price Administrator, in which details were set forth for what Mr. Jackson described as a guide for action against "possible price inflation and consumer exploitation." Superficially, the letter had appeared to place the Justice Department's machinery at the disposal of OPACS.

The arrangement between the two agencies, which has been given the approval of President Roosevelt, authorizes the following steps: certification by Mr. Henderson that prices are being driven up by a method involving probable violation of anti-trust laws; priority of investigation and prosecution of OPACS cases by the Justice Department; submission to Mr. Henderson of the Justice Department's proposals of anti-trust proceedings to determine whether OPACS's efforts would be adversely affected; submission to the Justice Department of price actions proposed by Mr. Henderson.

OPACS's enforcement powers, which are not strengthened or expanded by the new arrangement, are conferred by executive order rather than by law. Their extent was outlined in THE IRON AGE for May 1, page 92.

Mr. Jackson's statement represents, to some observers, an effort to publicize the attorney general's part in defense, and to edge from the spotlight the anti-trust activities of Assistant Attorney General Thurman Arnold.

President Roosevelt has revealed that Administration advisers are completing a price control study.

Adjustments Coming, Leon Henderson Says

Chicago

• • • **Drastic cuts in** raw materials, dilution of highly skilled labor, transportation difficulties and enforced simplification of products were forecast on Monday by Price Administrator Leon Henderson. American industry, he said, will shortly be called up to make "types of adjustments" not faced in two decades.

And this is only the beginning, Mr. Henderson told members of the National Association of Manufacturers. The OPACS head bluntly asserted that "we're running into shortages" because the country's productive mechanism is already operating at a rate nearly 35 per cent higher than it did in 1929.

He conceded that the program will prompt "groans and grunts" but predicted the result will be "the greatest job of a great industrial age done on time."

Virginia Geologist Joins Ferrous Alloys Branch

Washington

• • • **E. R. Stettinius, Jr.,** OPM Director of Priorities, announced on Monday that Dr. Wilbur A. Nelson, professor of economic geology and head of the geology department of the University of Virginia, has been appointed as a staff expert to the Ferrous Alloys and Minerals Branch of the Priorities Division.

John Harris Ward, assistant to the financial vice president of Commonwealth Edison Co., Chicago, has been named assistant chief of the inventory control in the Minerals and Metals Group. L. J. Martin heads the inventory control.

Ambulances Donated by Scrap Trade Not Lost on Zamzam

• • • **The sixteen ambulances** donated by chapters of the Institute of Scrap Iron & Steel to the British war effort were not on the recently sunk steamer *Zamzam*, it is reported. The ambulances, valued at $31,000, were originally scheduled to be shipped on the *Zamzam*, but were shifted to another boat, and are now on their way to North Africa.

$5.1 Billions Paid For Defense So Far

• • • **Government cash payments for the national defense program on May 1 amounted to $5.1 billion, while contracts awarded on that date totaled $15.2 billion, the Office of Production Management reports.**

This is how the $5.1 billion was disbursed (in millions of dollars):

Naval ships	**$621**
Aircraft	**605**
Ordnance	**501**
Stations, bases, fortifications	**1,104**
Industrial facilities	**305**
Other materials and equipment, etc.	**1,100**
Pay rolls	**864**
Total	**$5,100**

(A total of $37,871,000,000 has been appropriated and authorized by Congress since June, 1940, for defense.)

SWOC Asks Election at Six Bethlehem Plants

• • • **The Steel Workers** Organizing Committee, through Lee Pressman, CIO general counsel, has requested the NLRB to hold elections at Bethlehem Steel Co. plants at Johnstown, Pottstown, Rankin and Leetsdale, all in Pennsylvania, and at two plants at Los Angeles. In an election May 14 at Bethlehem's Lackawanna, N. Y., plant, 8223 steel workers voted for the SWOC and 2961 against.

Long Island Airplane Engine Plant to Expand

• • • **A total of $1,478,800,** including equipment, will be spent in the latest expansion of the aircraft factory at Farmingdale, Long Island, of the Ranger Engineering Corp., engine manufacturing division of the Fairchild Aviation Corp. The addition will double the firm's space for aircraft engines.

Ford V-8 Price Up $15

• • • **First inkling of** a possible industry-wide upward movement in prices is the fact that Ford Motor Co. last week effected a $15 price boost on 1941 V-8 models, while at the same time it announced that the new six cylinder engine would sell at a price $15 below the V-8 figure.

Canada's Steel Output At New High for April

Toronto, Can.

• • • **Canadian production of** steel ingots and direct steel castings made an all-time high record in April and also for the first four months of this year. During April, output totaled 200,680 gross tons, which compares with 195,481 gross tons in March and 153,451 gross tons in April, 1940. For the four months ended with April production of steel ingots and direct steel castings totaled 755,162 gross tons, as against 617,616 gross tons in the corresponding period of 1940 and 350,826 gross tons in 1939.

Output of ferroalloys in April rose to 16,161 gross tons, a slight gain over the 15,201 tons produced in March and compares with 13,989 tons in April, 1940. For the first four months this year production totaled 58,064 gross tons, a new high record, and compares with 37,844 gross tons in 1940 and 15,964 gross tons in the first four months of 1939.

Pig iron production in April totaled 103,326 gross tons, with an average daily output of 3444 tons, and compares with 102,038 tons in March, and daily average of 3292 tons, and with April, 1940, of 84,210 gross tons or daily average of 2807 tons. Cumulative production of pig iron for the four months ending with April totaled 399,614 gross tons, compared with 367,717 gross tons for the corresponding period of 1940 and 185,970 tons for 1939.

Shortages Will Spread, Stettinius Declares

Washington

• • • **OPM Director of** Priorities E. R. Stettinius, Jr., has announced additional government controls for defense needs will be necessary and that increased attention must be given to the need for reducing excessive inventories and the demands for careful scheduling of production and deliveries. Shortages of materials will grow worse, Mr. Stettinius said.

Mr. Stettinius stated that American industry in May had approximately 15,500,000 lb. of nickel, almost all of it coming from Canada.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **V. P. Rumely** has been elected vice-president in charge of manufacturing of the Crane Co., Chicago, succeeding **J. H. Collier** who was made president earlier this month. Mr. Rumely had been works manager of the Crane Chicago plant for the past four years. After studying mechanical engineering at Purdue University and the University of Wisconsin, he joined the farm implement plant of his grandfather in La Porte, Ind. From 1914 to 1915 he was with the Buick Motor Co. and in 1916 he went to the Hudson Motor Co. Starting in the Hudson shops, he progressed through every stage of production management to superintendent and factory manager, the position he held when he resigned to join the Crane organization in 1937.

• **J. M. Howell,** executive assistant to **E. D. Spicer,** manager of the Schenectady works, General Electric Co., was named to succeed his chief, who has been advanced to the post of assistant to the vice-president in charge of manufacturing. Mr. Howell started his career at General Electric 40 years ago when he was engaged as a shop clerk. From 1901 to 1937 he served in various accounting positions until he was made executive assistant to Mr. Spicer. A graduate of Cornell University in 1912, Mr. Spicer was chief engineer and factory manager of Kerr Turbine Co., Wellsville, N. Y., before going to General Electric.

• **Lee H. Hill,** vice-president, Allis-Chalmers Mfg. Co., Milwaukee, will head the newly created industrial relations department. Mr. Hill, formerly assistant manager of the electrical department, will be in charge of collective bargaining, grievance procedure, employment, wage policies and levels and all other subjects which bear on management-employee relations.

• **Paul Smith and William Bryant,** members of Buick's manufacturing staff, have been given leaves of absence for the duration of the national defense emergency to permit them to accept supervisory positions with North American Aviation at Inglewood, Cal.

• **H. W. Graham,** director of research, Jones & Laughlin Steel Corp., Pittsburgh, has been made chairman of the committee on iron and steel of the National Research Council's South American committee. Mr. Graham was a member of a group of 21 executives who recently visited South American countries to observe industrial progress and to make a report for the council which will be submitted to Jesse Jones, secretary of commerce.

• **W. T. Gray,** formerly assistant superintendent, Becton, Dickinson & Co., Rutherford, N. J., has recently been appointed factory manager of the instrument division of Thomas A. Edison, Inc., Orange, N. J. This division is being greatly expanded because of the enlarged demand for aircraft engine instruments. Mr. Gray is past chairman of the New York-New Jersey chapter of the American Society of Tool Engineers and is a director of the society. He is also a member of the American Society for Metals.

V. P. RUMELY, vice-president in charge of manufacturing, Crane Co., Chicago.

• **E. G. Price** has been named general superintendent of the Lorain, Ohio, plant of the National Tube Co., U. S. Steel Corp. subsidiary. Mr. Price succeeds **Earl W. Brown,** superintendent for the last 11 years, who goes to Pittsburgh plant where he will join the staff of E. N. Sanders, vice-president in charge of operations.

• **Harry L. Wilcox,** assistant chief engineer of the Electric Controller & Mfg. Co., is the new president of the Cleveland Engineering Society. Other new officers are: Vice-president, **Walter C. Sutton,** Lindsay Wire Weaving Co., and treasurer, **Carlton R. Sabin,** president Sabin Engineering Co.

• **Emil P. Rohrbach** has been named superintendent of the machine division under **C. B. Dakin,** newly appointed manager of the General Motors forge plant, Lansing, Mich. **Harry Howell,** superintendent of the forge division, **Joseph Hartman,** assistant superintendent, and **John A. Thomann,** production, also will be associated with Mr. Dakin. **Maynard T. Murray,** formerly manager of the Olds exhibit and display department, has been named assistant manager of the gun division. Also assigned to that division are **John Coleman** as production engineer and **Philip Monaghan** as methods engineer.

• **Harry Lynn Pierson,** president-treasurer, Detroit Harvester Co., has been elected vice-president of the Detroit Board of Commerce for the fiscal year beginning July 1.

• **John P. Arnoldy** has been elected president of the Warman Steel Casting Co., Los Angeles, succeeding the late Charles J. Wild. Mr. Arnoldy has been with the company since 1917, becoming secretary in 1923. In 1925 he was elected general manager, which position he still retains. **Florence D. Wild** has been elected treasurer and continues as vice-president and **William P. McGervey,** Jr., who joined the organization in 1937, was elected secretary to replace Mr. Arnoldy. He was also named assistant general manager.

• **G. H. Bendell,** who has been superintendent at the Waukegan,

Ill., works of the American Steel & Wire Co., Pittsburgh, subsidiary of the U. S. Steel Corp., has been transferred to Joliet as assistant general superintendent of Joliet operations. **S. R. Snow,** formerly assistant superintendent at Waukegan, has been made general superintendent. Mr. Snow's place is being taken by **J. R. Gaut,** who is being transferred from the vice-president's office in Cleveland.

• **Van H. Leichliter,** formerly superintendent of wire mill, Cuyahoga works, Cleveland, has been appointed superintendent, wire mills, South works, Worcester, succeeding **F. P. Leahey,** who has been appointed superintendent, wire mill, Cuyahoga works.

• **Daniel Lynch** has been named superintendent of the Rockdale division, Joliet, and **R. E. Camp,** superintendent of the Scott Street division. **R. L. Lewis** has been appointed superintendent of engineering and maintenance at Waukegan, **W. B. McShane,** superintendent of the wire mills, **J. H. Thomas,** superintendent of the spring mills, and **Thomas Tyrrell,** superintendent of rod mills.

• **Lawrence W. Howe** has been named vice-president and general manager of the Lincoln Park Tool & Gage Co., Lincoln Park, Mich., in charge of the company's sales activities.

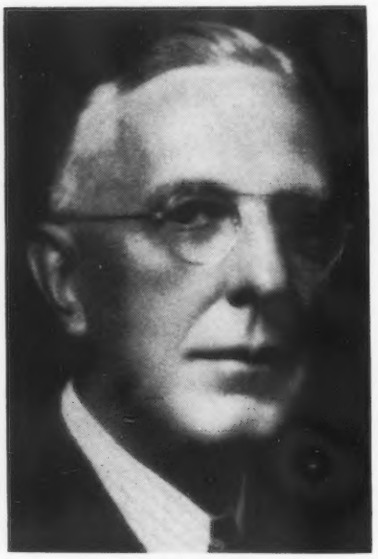
• **Barney Castor** has been appointed direct factory representative on the West Coast of the National Engineering Co., Chicago.

• **James Coombe** has been elected president of the William Powell Co., Cincinnati. Harry H. Coombe has been elected chairman of the board of directors and treasurer; George E. Weitkamp, first vice-president and secretary; David M. Forker, Oliver F. Gang, William E. Heilig and E. R. Noll, vice-presidents, and William E. Minor, Jr., assistant to the president.

• **J. A. McCoy** of Des Moines, Iowa, has been appointed Iowa representative of the Logan Engineering Co., Chicago.

• **F. S. Haggerson** has been placed in charge of the Pittsburgh office of the National Carbon Co., New York.

• **C. F. Bennett** has retired as president of the Stanley Works, New Britain, Conn., and is now



C. F. BENNETT, chairman of the board, who retired as president of the Stanley Works, New Britain, Conn.

chairman of the board of directors. Mr. Bennett joined the Stanley Works 50 years ago as a shipping clerk but before long was made a member of the production department. In 1912 he became a director of the company and four years later he was elected second vice-president. In 1918 he became first vice-president. Mr. Bennett was made president of the company in 1923 and held that position until this year when **Richard E. Pritchard** succeeded him as president.

• **C. G. Tyler,** formerly connected with the railroad division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has now joined the industrial division serving the Columbus, Ohio, district. This district was formerly covered by **Win Adams** who has been transferred to the Buffalo territory. **Arthur B. Bleecker,** formerly with the Los Angeles branch of the Creamery Mfg. Co., will represent all four of the industrial divisions of Manning, Maxwell & Moore in the Pacific Northwest.

• **George B. Svenson** has rejoined the Hanson-Van Winkle-Munning Co., Matawan, N. J., with headquarters in Cleveland.

• **Leland H. Grenell** has been appointed by the Battelle Memorial Institute for research and development work in improved alloys of copper for industrial application. Mr. Grenell is a graduate in metallurgical engineering of the Pennsylvania State College. For the past five years, he has been engaged in process engineering and materials development for the Frigidaire division, General Motors Corp., Dayton, Ohio.

• **William L. Weeks,** veteran member of the sales force of the Tennessee Coal, Iron & Railroad Co., Birmingham, has retired after reaching the compulsory retirement age of 70. Born in Rochester, Ky., May 17, 1871, Mr. Weeks entered the service of the American Steel & Wire Company at Birmingham in 1910. He was transferred to the Tennessee company's sales department when the wire company's Birmingham operations were absorbed in March, 1933.

• **Benjamin P. Curtis,** heretofore a basic slag salesman for the Tennessee Coal, Iron & Railroad Co., Birmingham, has been appointed head of the basic slag division of the company, succeeding the late S. D. Nance, who died in April. Mr. Curtis has been in the employ of the Tennessee company since 1927, when he started work as an inspector at Fairfield sheet mill. He is a graduate of Alabama Polytechnic Institute, Auburn.

• **J. E. Harris,** superintendent of the Milwaukee plant of the International Harvester Co., has been promoted to take charge of the company's Minneapolis-St. Paul plants.

• **R. C. Adams** has joined W. H. Bixby, Inc., Des Moines, Iowa, as a sales engineer.

• **Myron A. Wick** will resign as vice-president in charge of finance and director of Republic Steel Corp., Cleveland, effective July 1. Mr. Wick, who was president of Steel & Tubes, Inc., now a part of Republic, joined the Republic organization in 1930 as assistant to the president. The following year he was named vice-president in charge of finance. His future plans are indefinite.

• **Fred W. Bush** and **W. C. Sealey** have been promoted to key positions in Allis-Chalmers transformer division, with headquarters in Milwaukee, succeeding **L. H. Hill,** recently appointed assistant manager of the company's electrical

department. Mr. Bush has been made engineer-in-charge of transformer sales and Mr. Sealey, engineer-in-charge of transformer design. Mr. Bush, a graduate of the Georgia School of Technology, joined Allis-Chalmers in 1928 and has been connected with transformer engineering, development and sales since 1930. Mr. Sealey, a graduate of the Carnegie Institute of Technology, joined the Allis-Chalmers transformer division in 1931 when the company absorbed the American Brown Boveri interest, and prior to 1928 was connected for several years with the transformer division of Westinghouse.

• **G. S. Mican** was appointed assistant division superintendent of rolling and **D. F. Farnsworth** appointed superintendent of the No. 1-40 in. and 35 in. blooming mills and the 28-32 in. and 22 in. structural mills at South works, Chicago, of Carnegie-Illinois Steel Corp. Mr. Mican has been employed at South works since 1919 when he began as an apprentice in the machine shop. He subsequently served in a number of capacities and in 1933 was made assistant superintendent of the 96-in. plate mill, four years later becoming superintendent of this mill. He has been superintendent of structural and blooming mills since 1940.

Mr. Farnsworth went to South works in 1930 from the Worcester, Mass., plant of the American Steel & Wire Co., another United States Steel subsidiary, where he had been employed in the rolling mill and investigation department since 1925. Beginning as an instrument man in the civil engineering department at South works, he was soon transferred to the 28-32 in. structural mills as a mill investigator and subsequently served as warehouse foreman and special steel investigator of these mills. In 1936 he was made field engineer and a short time later became assistant superintendent of the 12-16 in. alloy mills, a position he held for three years. He has been assistant superintendent of the structural and blooming mills since 1939.

• **Dr. C. F. Rassweiler,** formerly director of the Philadelphia laboratory of E. I. du Pont de Nemours Co., has been appointed director of research of the Johns-Manville Corp., New York. Born

DR. C. F. RASSWEILER, director of research, Johns-Manville Corp., New York.

in Polo, Ill., Dr. Rassweiler was graduated with a bachelor of science degree in chemistry from the University of Denver in 1920. His doctorate was obtained from the University of Illinois in 1924. In 1924, he joined the du Pont organization as a research chemist and since 1932 had been director of the du Pont laboratory in Philadelphia.

• **J. Arthur Deakin** has been appointed Eastern district manager for McKenna Metals Co., Latrobe, Pa., with headquarters at New York. Mr. Deakin has been engaged continuously in the carbide tool business since its inception in this country in 1928, and for many years previous was active in the machine tool field. He was appointed Eastern representative by McKenna Metals when they first introduced Kennametal in 1938.

• **Oscar N. Lindahl** has been elected vice-president in charge of finance, Carnegie-Illinois Steel Corp., Pittsburgh, succeeding **M. D. Howell** who will devote all of his time to duties as vice-president —financial, secretary and treasurer of U. S. Steel Corp. of Delaware. Mr. Lindahl has been associated with the Universal Atlas Cement Co. since 1911, most recently as comptroller and secretary. Mr. Lindahl entered the employ of U. S. Steel subsidiaries with the Illinois Steel Co. in 1907 and joined Universal Atlas Cement Co. in 1911. He served the cement company successively as general bookkeeper, chief accountant, auditor and assistant secretary, and comptroller and secretary.

• **F. C. Jones,** formerly on the staff of the assistant to the president of Handy & Harman, New York, has been appointed manager of the Bridgeport, Conn., plant. **J. L. Christie** has been named metallurgical engineer. **Thomas H. Gallagher,** heretofore in charge of the Chicago sales office, has been appointed assistant treasurer of the corporation and manager of the Toronto, Ont., plant replacing **J. W. Colgan** who becomes sales manager of the parent company.

• **Glen A. Beaumont,** formerly general superintendent of the Hanna Furnace Corp., Buffalo, N. Y., has been appointed chief metallurgist of that company with headquarters both in Buffalo and Detroit. Mr. Beaumont has been connected with Hanna since 1923 and has served in various capacities, of which the most recent were chief chemist and general superintendent respectively. **Charles H. Heist** has been appointed general superintendent at Buffalo, succeeding Mr. Beaumont. Mr. Heist was formerly representative and service engineer for the Standard Lime & Stone Co. of Baltimore. From 1912 to 1917 he served as chief chemist of the Federal Furnace Co., South Chicago. For the next two years he was assistant blast furnace superintendent of Whitaker Glessner blast furnaces at Portsmouth, Ohio. He served as blast furnace superintendent, assistant manager, and manager of the Mayville Iron Co., Mayville, Wis., from 1919 to 1928. From 1928 to 1935 Mr. Heist was superintendent of the blast furnaces of the Youngstown plant of the Youngstown Sheet & Tube Co. and assistant general superintendent of the Campbell and Struthers works of the Youngstown Sheet & Tube Co. In 1935 he became connected with the Standard Lime & Stone Co.

• **H. J. Lynch** has been appointed Detroit district representative of Morris Machine Works, Baldwinsville, N. Y., with offices at 403 Kales Building.

Obituary

• **Alfred W. Minuse,** assistant manager of sales of the New York office of Republic Steel Corp., died last Saturday from a heart attack at the age of 61. He had not been ill, having spent all of Saturday morning at his office in the Chrysler Building. A graduate of the Webb Institute of Naval Architecture, he entered the alloy steel field when it was in its infancy. He was with the old United Alloy Steel Corp., then with Central Alloy Steel Corp., its successor, and continued with the Republic Steel Corp. after Central Alloy became a part of that corporation. He was a retired lieutenant commander of the United States Navy. During the World War he served as a civilian in the Ordnance Department of the Navy and was in charge of the remodeling of the steamship Leviathan into a troop transport. He made the first two trips on that boat as an executive officer.

• **William S. Bidle,** aged 68 years, president of W. S. Bidle Co., Cleveland, died May 11 in Cleveland. He was a former president of the American Society for Metals.

• **Oliver W. Upson,** vice-president, Upson-Walton Co., Cleveland, died May 12 aged 66 years.

• **Rudolph J. Ketz,** treasurer for the past three years of Pressure Castings, Inc., Cleveland, died April 11 in that city.

• **Henry C. Zeeryp,** manager of the Cleveland office of Otis Elevator Co., died May 10 in Cleveland. He was 48 years old.

• **Wellington D. Barker,** 49 years old, manager of the Keyes-Davis Co., Battle Creek, Mich., was killed May 6 in an automobile accident.

• **Cornelius K. Chapin,** president of the Murchey Machine & Tool Co., died in Cleveland May 6, while attending the spring meeting of the National Machine Tool Builders Association. He was 64 years old. Mr. Chapin's brother was the late Roy D. Chapin, president of Hudson Motor Car Co., and Secretary of Commerce under President Hoover.

• **George N. Goodnow,** mechanical engineer for the Fisher Body Co., Lansing, Mich., died recently at Jackson, Mich., of injuries received in an automobile accident. He was born 43 years ago in Waukegan, Ill.

• **Thomas H. Fraser,** 77 years old, former proprietor of the Detroit Brass Co., and an early manufacturer of brass in the Detroit area, died recently.

• **H. S. Coblentz,** assistant manager of conduit sales for Youngstown Sheet & Tube Co., died May 9 in Youngstown.

• **Walter S. Cochrane,** since 1926 a member of the engineering staff of the Chrysler Co., died May 9 at his home in Detroit. Before joining the staff of the Chrysler Co., Mr. Cochrane was for 13 years an engineer with the Buick Motor Car Co. He was born in Almont, Mich., 55 years ago.

• **Warren H. Walker,** vice-president of the Walker Mfg. Co., Racine, Wis., died May 7 at Rochester, Minn. He and his brother, Willard Walker, founded the company in 1910. Mr. Walker, a native of Racine, was 61 years old.

• **Edward H. Zuehlke,** until recently Milwaukee manager for the Patent Scaffolding Co., died May 15 at his home. He was 59 years old.

• **Oliver B. Zimmerman,** last year's winner of the Cyrus Hall McCormick gold medal for outstanding work in agricultural engineering, and author of many articles for technical journals, died May 10 in Chicago, aged 68 years. He was a graduate of the college of engineering at the University of Wisconsin and, after teaching for several years in Milwaukee high schools, went back to the university as an instructor. He began his industrial career with J. R. Schwab & Sons Co., Milwaukee, and in 1911 joined the International Harvester Co., where he remained until his retirement in 1935. He was a former president of the American Society of Automotive Engineers.

• **Leon Brichant,** president of the European Cartel for hoops, bands, skelp and wire rods, and a director of a number of Belgian steel mills, died on April 17 in Brussels, as a result of pneumonia contracted on a trip to Russia to arrange for shipments of food to Belgium. Monsieur Brichant was awarded the Order of Leopold by the King of Belgium in 1935. He was 65 years old.

• **William H. Morris,** aged 43 years, vice-president since 1932 of Edward T. Ward Sons Co., Pittsburgh, affiliated with Columbia Steel & Shafting Co. and the Summerill Tubing Co., died at his home in Pittsburgh May 21. Mr. Morris had been associated with the organization since 1916, at which time the company was operating as Columbia Steel & Shafting Co.

• **Edward Gruber,** former factory manager of Hydraulic Pressed Steel Co., Cleveland, died May 17. Mr. Gruber was also a former foreman of the press room of Cleveland Tractor Co., and for the past 10 years had been working with E. E. Allyn, Allyn-Ryan Foundry Co., Cleveland, in development work. He was 67 years old.

• **Clarence M. Henderson,** aged 66 years, for the past three years president and general manager of H. C. Macaulay Foundry Co., Berkeley, Cal., died at his home last week. Previous to his becoming president, he was for 32 years secretary of the company.

• **Glenn Harrison Barnard,** general manager of the Electro Dynamic Works of the Electric Boat Co., Bayonne, N. J., died on May 6.

• **John J. Hartle,** a machinery broker in Cleveland for 20 years and previously vice-president of the old Cleveland Belting & Machinery Co., which he helped to organize, died May 19.

• **Irwin A. McIntyre,** one of the founders of the Milwaukee Steel Foundry Co., and at the time of his death assignment officer for the WPA in Milwaukee county, died May 22. He was 55 years of age. Before being elected director and secretary of the foundry firm he was purchasing agent and assistant to the general manager of the International Harvester Co.

Metal Working Activity

. . . *Latest Data Assembled by The Iron Age*

From Recognized Sources. In Net Tons.

	March 1941	Feb. 1941	March 1940	3 Months 1941	3 Months 1940
Steel Ingots:					
Monthly output[a]	7,146,372	6,250,413	4,390,090	20,339,869	14,685,960
Average weekly output[a]	1,613,177	1,562,603	990,991	1,581,638	1,129,689
Per cent of capacity[a]	100	96.8	63.5	98.0	72.4
Pig Iron:					
Monthly output[b]	4,704,135	4,197,872	3,270,499	13,565,702	10,614,001
Raw Materials:					
Coke output[c]	5,584,909	4,998,491	4,259,848	16,030,389	13,377,238
Lake ore consumed[d]	7,180,915	6,353,946	4,578,299	20,625,601	15,253,184
Scrap iron consumed	5,221,440	4,673,000	3,055,360	14,685,440	10,215,520
Castings:					
Malleable, orders[e]	86,293	76,055	35,730	243,437	111,069
Steel, orders[e]	126,140	105,125	36,612	341,844	120,646
Finished Steel:					
Trackwork shipments[a]	10,225	7,973	8,446	25,033	22,106
Fabricated shape orders[f]	187,143	165,371	128,321	619,108	308,892
U. S. Steel Corp. shipments[g]	1,720,366	1,548,451	931,905	4,951,271	3,086,753
Fabricated Products:					
Automobile production[h]	533,912	485,523	423,620	1,567,271	1,259,931
Steel furniture shipments[e], value	$3,821,375	$3,368,019	$2,424,300	$10,341,407	$6,663,125
Steel boiler orders[e] (sq. ft.)	3,521,751	1,543,821	760,668	7,275,619	1,853,231
Locomotives ordered[i]	119	127	41	324	104
Freight cars ordered[i]	7,685	5,645	1,851	27,448	5,078
Foundry equipment index[k]	272.7	281.1	183.2	279.7	156.0†
Gear sales index	288	262	114	270†	118†
Non-Ferrous Metals: (U. S. only)					
Lead shipments[l]	62,090	54,859	46,353	172,660	125,404
Lead stocks[l]	45,996	46,604	74,692	.....	.....
Zinc shipments[m]	63,483	59,220	49,909	185,975	155,821
Zinc stocks[m]	6,969	7,086	72,144	.....	.....
Tin deliveries[n]	18,023	13,658	10,353	45,973	28,699
Refined copper deliveries[o]	134,333	112,808	64,376	366,877	219,019
Refined copper stocks[o]	89,873	97,689	159,795	.....	.....
Exports:					
Total iron and steel[p]	512,844	672,269	743,658	1,967,828	1,998,480
All rolled and finished steel[p]	283,458	323,338	357,722	923,289	966,341
Semi-finished steel[p]	186,028	199,531	115,027	697,991	278,535
Scrap[p]	54,383	83,303	231,579	188,148	650,212
Imports:					
Total iron and steel[p]	872	892	5,096	2,238	20,110
Pig iron[p]	.....	.....	583	.....	4,529
All rolled and finished steel[p]	5,041	607	2,474	6,350	6,159

Sources of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary estimates by THE IRON AGE—Final figures from Bureau of the Census, U. S. only; [i] *Railway Age*; [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel; [s] American Gear Manufacturers Association.

* Not available. † Monthly averages.

Figures in Italics represent a two months' period.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	May 27, 1941	May 20, 1941	Apr. 29, 1941	May 28, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	May 27, 1941	May 20, 1941	Apr. 29, 1941	May 28, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	31.34	31.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$18.75
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.50
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	17.25
Carwheels, Chicago	....	....	....	18.75
Carwheels, Philadelphia	....	....	....	20.75
No. 1 cast, Pittsburgh	22.00	22.00	23.25	19.25
No. 1 cast, Philadelphia	24.00	24.00	24.00	20.75
No. 1 cast, Ch'go	*21.00	*21.00	*22.60	16.75

*Changed to gross ton basis.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$5.625	$4.00
Foundry coke, prompt	6.875	6.875	6.25	5.25
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.50
Copper, Lake, New York	12.00	12.00	12.00	11.50
Tin (Straits), New York	*52.125*	52.25	51.75	53.50
Zinc, East St. Louis	7.25	7.25	7.25	6.00
Lead, St. Louis	5.70	5.70	5.70	4.85
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 111-120 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
May 27, 1941	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26c. a Lb.	$22.61 a Gross Ton	$18.17 a Gross Ton

	High	Low	High	Low	High	Low
1941			$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.261c., Jan. 2	2.211c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Steel supply situation has reached an impasse which indicates mandatory priorities as only escape . . . Civilian use of steel bound to be curtailed as a result of heavier defense requirements . . . Insufficient flow of steel scrap to mills causing concern.

THE steel situation has arrived at an impasse from which the only way of escape is by the prompt adoption of mandatory priorities, especially on those products in which the demand far exceeds the available supply. That such action will be taken soon at Washington there seems to be no doubt. Products which are likely to be included in the first order under the new priorities law are plates, shapes, bars and semi-finished steel.

Defense requirements amounting to several million tons, for which a place must be found on mill schedules, have brought about further congestion of steel orders, actual and prospective. As much of this tonnage calls for deliveries starting fairly soon, the inevitable result will be to push aside commercial orders, many of which have already been delayed weeks beyond the time of shipment originally promised. Consumption of steel for civilian uses is beginning to feel the effects of the mounting requirements for defense. That such steel uses as are not essential to defense or national welfare will be further restricted in the coming months is becoming more obvious with each passing week.

AMONG the large requirements for which rolling space must be found are steel for ships, railroad equipment, pipe lines and shells. Within the past week more than 500,000 tons of plates and other products have been allocated for ships, including the latest addition of 123 units to the merchant ship program. Railroad requirements over the remainder of this year, which have been estimated at upward of 500,000 tons, probably will obtain the benefit of priority rating, the lack of which has forced the curtailment of car building operations at two or three shops. Several hundred thousand tons of shell rounds, initiating a program that will take upward of 4,000,000 tons, are also to be allocated soon. Then there is the British program, amounting to 1,000,000 tons of semi-finished and finished steel, on which bids were closed last Saturday by the Secretary of the Treasury under the Lease-Lend bill and which will be allocated to various mills within a short time. In addition to this 1,000,000 tons of steel, the British want 240,000 tons of low phosphorus and Bessemer pig iron over a period of five months and 300,000 to 400,000 tons of tin plate over a year.

Coinciding with these developments is the sudden influx of line pipe inquiries. They aggregate close to 2,000,000 tons, of which about 1,000,000 tons take a defense rating. The others stand little chance of being considered at this time. In addition to the Plantation and Portland-Montreal pipe lines, amounting to more than 150,000 tons, which were awarded last week, there are two other large lines, one of 1500 miles of 24-in. pipe to run from Texas to New Jersey, and the other of 1600 miles of 20 in. pipe from Port Arthur, Tex., to New York. These two projects would take 850,000 tons of pipe. At least one of them, taking 500,000 tons, would be plate fabricated pipe, the plates to be furnished by continuous sheet-strip mills, thereby displacing sheets.

THE revised report on steel capacity by Gano Dunn probably will be presented to President Roosevelt this week. Some expansion of facilities by existing steel companies rather than construction of entirely new plants may be advocated. During the past week steel companies have inquired for equipment for installation of new blast furnaces, open hearth furnaces and blooming mills. A steel plant expansion program seems to be indicated, though not of the "fantastic" proportions advocated by some Washington authorities.

The Office of Price Administration and Civilian Supply will issue an order this week amending the steel price order of April 17. It is expected that the effective date of the order will be changed from March 31 to April 17, thereby permitting price advances on galvanized pipe and galvanized wire nails which were made subsequent to March 31 but before April 17, to stand. A ruling is also expected that will permit steel companies to quote f.o.b. their nearest basing point when shipping to a territory governed by another basing point. Export prices probably will be established on the basis of the quotations of the Steel Export Association of America rather than domestic prices, the former having been higher.

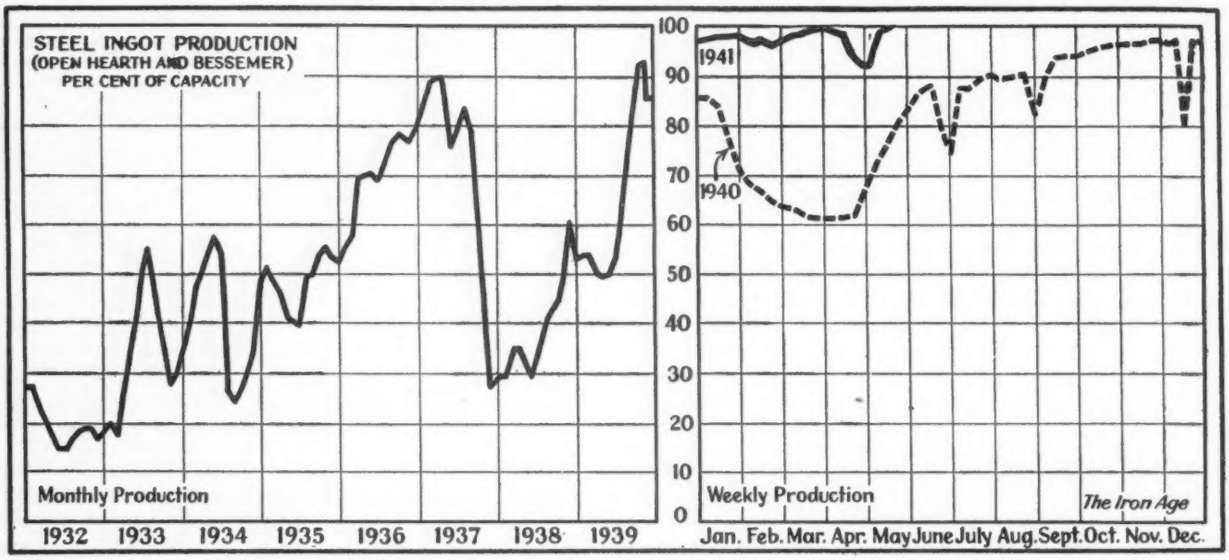
Various meetings in Washington have been concerned with the iron and steel scrap situation both with respect to prices and the available supply. Some steel companies are melting more scrap than they are receiving and their situation will be serious within another few weeks unless some way is found to increase the flow of scrap. There is still a great deal of confusion regarding the recent scrap price order, which will be clarified in several particulars.

The Industrial Pace . . .

Despite another small gain in the past week, activity in the capital goods industries, as measured by THE IRON AGE index, has not yet fully regained all the ground lost during the recent coal strike. The index at the close of the past week stood at 112.9 per cent of the base years, as compared with 111.8 in the preceding week and 119 in the week previous to the coal strike. Chief factor in the present strength of the index is the automobile industry. With buyers endeavoring to protect themselves against curtailment of production to begin in August, production in the past week rose to 133,560 units, highest this year. Steel production also showed a further gain in the past week, as did lumber carloadings and activity in the Pittsburgh district.

Only factor of the index to lose ground was the heavy construction series. New construction awards placed in the past week amounted to $52,346,000, the lowest weekly total thus far this year, but 19 per cent above a year ago. The steady decline in awards over recent weeks is believed to reflect the change-over from pre-Lend-Lease bill conditions to the new situation wherein all arms work will be controlled directly by the United States.

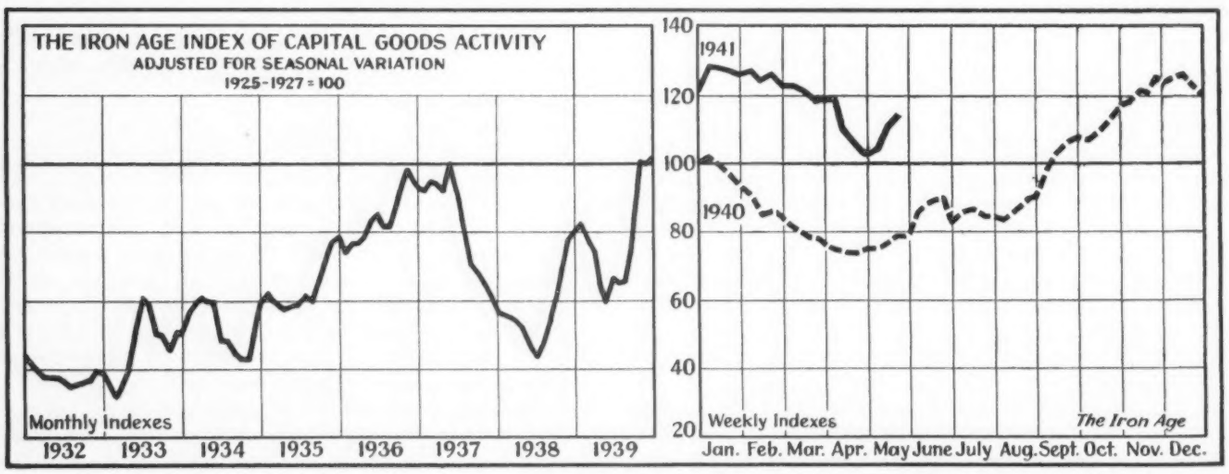
Production Rate Dips to 99%



District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week ..	101.0	101.0	99.0	96.0	97.0	106.0	85.0	104.0	99.0	91.5	102.5	111.0	95.5	99.0
Previous Week..	101.0	102.5	99.0	96.0	96.0	106.0	85.0	97.5*	99.0	104.0	102.5	111.0	101.5	100.0

* Revised.

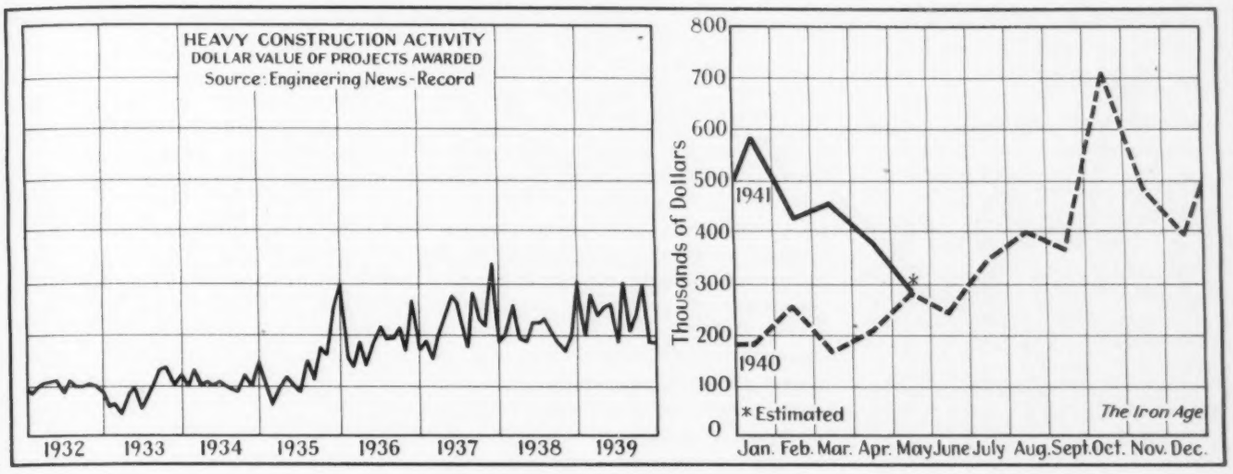
Index Shows Moderate Advance



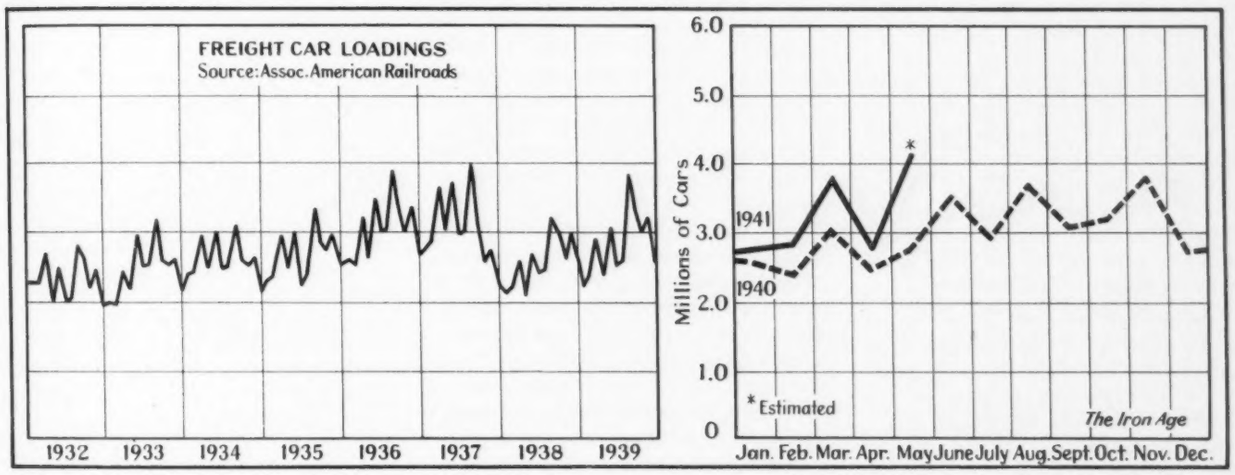
Component — Week Ended →	May 24	May 17	Apr. 26	May 25 1940	May 25 1929
Steel ingot production[1]	136.1	134.0	127.5	96.6	128.0
Automobile production[2]	114.3	107.7	87.7	82.8	129.8
Construction contracts[3]	112.9	120.8	132.2	61.6	130.4
Forest products carloadings[4]	73.2	71.6	72.5	61.6	120.4
Pittsburgh output and shipments[5]	127.8	124.8	94.5	89.2	126.1
COMBINED INDEX	112.9	111.8	102.9	78.4	126.9

Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended April 26. Other indexes cover week of May 3.

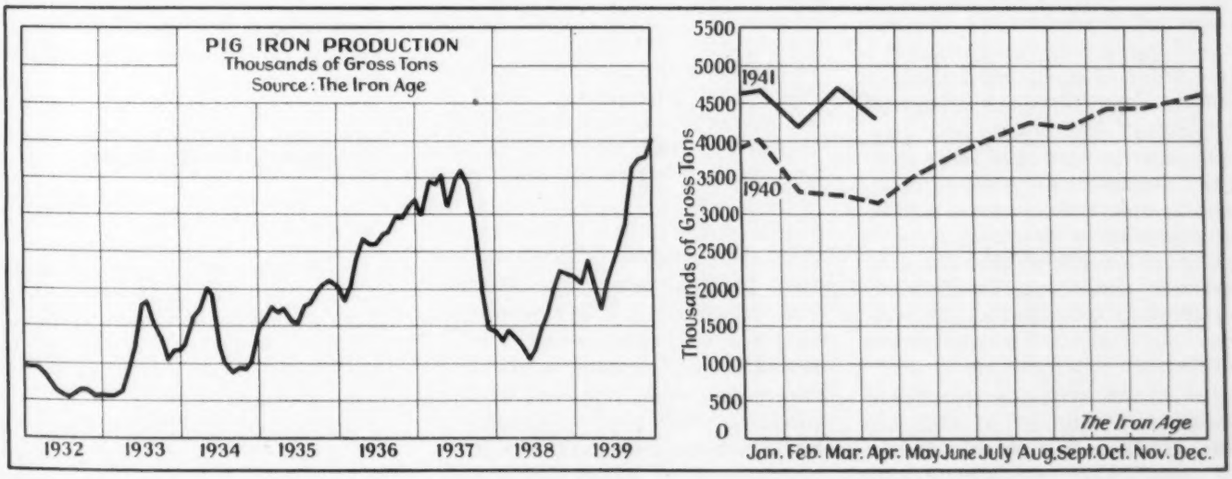
Construction Awards Drop Sharply



Carloadings Set 11-Year Record



Pig Iron Output Cut by Coal Strike



Market News

. . .THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . Large new projects coming into the market

Although incoming specifications so far this month are down 15 to 20 per cent at PITTSBURGH from a month ago, such comparisons are meaningless in view of the substantial projects which came into the market recently. The latter include an additional 500,000 tons of plates for shipbuilding, more than 150,000 tons of steel for two pipe lines and the possibility of two additional pipe lines, one to require more than 500,000 tons and the other to require approximately 350,000 tons.

PITTSBURGH makers look for record breaking steel production and shipments for months to come, as well as a rapid multiplication of the difficulties encountered in attempting to satisfy defense requirements promptly and at the same time give some measure of service to ordinary commercial accounts. Those PITTSBURGH steel makers who are looking at the situation realistically expect mandatory priorities on some steel products soon.

The desire to buy steel is as strong as ever among consumers at CLEVELAND, but those lacking preference ratings are finding it increasingly difficult to obtain deliveries anywhere near their desires. Even certain classes of priority business are being shoved back on mill schedules in favor of items deemed more urgent by defense authorities. Warehouses continue to encounter unprecedented demand. Steel for some of the parts for a large order of tanks being made in Ohio for Great Britain has been ordered out of warehouse.

Despite the fact that the weight of the armament program automatically is sidetracking some non-defense purchases, the placing of a ceiling on monthly production of consumer goods using steel would help immeasurably and at the same time help stabilize the employment picture.

New orders continue to drop in number and tonnage at CHICAGO mills. The average week's decline was about 20 per cent—though one producer had a gain of this amount. All steel makers are behind for the month.

Agricultural equipment manufacturers are exceptionally heavy purchasers, and automotive buyers are still pursuing a strong course, though pressure from this source is easier. Concrete bar orders were predominant in the past seven days. Steel makers estimate consumers' inventories at between 15 to 45 days —but that the inventory picture is precariously out of balance.

New business in ST. LOUIS is declining because the delivery situation makes it useless for consumers to place orders without priority.

Some steel consumers in eastern Pennsylvania who are making civilian goods almost exclusively are said to be facing a shortage of steel. None has been forced to curtail operations up to this time, but they may not be in this fortunate situation very long. The volume of steel orders placed in the eastern Pennsylvania district during the past week was close to previous peak levels. During May shipments by the mills have ranged from 65 to 80 per cent of incoming business, although one company reports shipments at only 50 per cent of new business. A non-integrated maker of steel pipe in eastern Pennsylvania is operating only three days a week owing to inability to obtain skelp for full operation.

At BIRMINGHAM, bookings have shown no inclination to decline. This is especially true in plates and shapes which are being eagerly sought after by the Pullman plant at Bessemer and for shipbuilding at Mobile and Pascagoula. The Pullman plant is especially pressing for deliveries, which are being further and further extended, and it is known that the plant has accepted less business than has been offered it in the past few weeks because of that identical situation. Pullman will continue uninterrupted into next year on orders already booked. Backlogs also continue to mount in sheets and even more so in wire products, the latter specification having shown considerable pick up since advent of warm weather.

Iron Ore

. . . Producer proposes tax on actual prices obtained

At recent hearings in St. Paul, Minn., the Oliver Iron Mining Co. initiated a proposal that the Minnesota Tax Commission assess occupational taxes for 1940 upon actual prices obtained for iron ore rather than the published Lake Erie price. The latter is usually considered a maximum price and not representative of true returns. It is understood independent mining companies favor a uniform basis for arriving at the value of ore whichever basis might be used.

Semi-Finished Steel

. . . Problems of allocation becoming insurmountable

The flow of semi-finished steel, the lifeline of finished steel production, is meeting more problems than at any time in steel history. All finished product departments are clamoring for a "just" share of semi-finished material but with ship plate, freight car shop material, ammunition steel, and now defense pipe line requirements, the difficulty of equitably allocating raw steel supplies is well-nigh insurmountable. Realistic steel sources claim the only way defense requirements can be met promptly is by side-stepping, cancelling, or deferring non-essential products — but such action would obviously have to be ordered by formal priority or allocation on the part of the government.

Warehouse Business

. . . Stocks are becoming unbalanced

With some mills falling far behind on delivery promises, CLEVELAND warehouse stocks are more unbalanced than ever, particularly in plates and sheets. Meanwhile demand continues intense.

Exhaustion of reserve stocks in the southern Ohio has slowed down warehouse bookings.

Railroad Buying

. . . Orders and inquiries for 12,000 freight cars

The freight car material situation up to Tuesday of this week was substantially unchanged from a week ago with some shops still down and others approaching a closing date Despite repeated assurances from Washington that car builders would get preference rating, no such formal orders were being displayed to steel companies up to Tuesday of this week. Some realistic sources are pointing out that preference rating action will not solve the railroad freight car material outlook, but warn that actual allocations of available plate tonnage will have to be made.

This week purchases of railroad equipment amount to some 6000 freight cars and 44 locomotives. Inquiries total 5725 freight cars.

Boston & Maine, Maine Central and Portland Terminal have ordered 500 50-ton gondolas and 200 50-ton hopper coal cars from Bethlehem Steel Co., 600 40-ton box cars from Magor Car Corp., and six diesel-electric switches of 660 and 1000 hp. from the Electro-Motive Corp. and American Locomotive Co.

Denver, Rio Grande Western bought 16 diesel-electric locomotives: three of 5400-hp. from Electro-Motive Corp., four of 1000-hp. from American Locomotive Co. and nine 600-hp. switches from Baldwin Locomotive Co. This road also bought 500 40-ton box cars from Pressed Steel Car Co. and four streamlined self-propelled passenger cars from Edward G. Budd Mfg. Co.

Union Pacific is building in company's shops 2000 50-ton box cars and 250 automobile cars.

Baltimore & Ohio has placed 1000 box cars with Pullman-Standard Car Mfg. Co. and 100 cabooses with own shops.

American Car & Foundry is to supply the Delaware & Hudson with 350 hoppers and 200 gondolas. Chicago & Eastern Illinois with 500 box cars, Erie with seven 70-ft. express cars and Wabash with 10 70-ton hopper cement cars.

Detroit, Toledo & Ironton is reported to have bought 50 hoppers from Greenville Steel Car Co.

Canadian Pacific has placed an order for 20 4-6-2 locomotives with the Montreal Locomotive Works.

The Navy is taking two diesel-electric 50-ton engines from the H. K. Porter Co.

Inquiries for 5725 freight cars came from three roads. Southern Pacific is inquiring for 2500 units, Santa Fe for 2000, and Western Maryland for 1225.

Sheets and Strip

. . . Commercial orders being pushed back by defense

The constant placement of ship plate tonnage and now the definite probability of several hundred thousand tons of line pipe plate being rolled on high speed mills has more or less demoralized commercial sheet deliveries. Some PITTSBURGH makers are unable to quote definite deliveries on hot and cold rolled sheets much before the end of the first quarter of 1942. Pressure from automobile companies for delivery of material now on order books is reaching an all-time high and specifications for 1942 model cars are being continually placed.

CLEVELAND reports that non-defense sheet and strip orders which a year ago would have received preferential deliveries are being pushed back six weeks to several months under the weight of the defense program. The necessity for high plate production from continuous mills is one of the principal reasons for this situation, which is well understood by consumers. One Ohio producer holds a full sheet and strip schedule for first quarter of 1942, due primarily to the moving back of non-defense business.

An interesting sidelight from CLEVELAND is the revelation that stainless steel mess trays for the Army and Navy are still being fabricated in large volume, despite the pleas for conservation of stainless for the aircraft and tank programs.

An order for close to 7500 tons of sheets from an agricultural implement manufacturer reached one CHICAGO mill this week. Another producer booked 20,000 tons for an automotive company. One mill there extended strip mill size deliveries one month to promises of nine to 10 months.

Merchant Bars

. . . Shell steel and British orders to come soon

Indirect defense needs are multiplying, but the heaviest avalanche of munition steel orders is still to come. Pressure from automobile companies for deliveries remains intense. PITTSBURGH bar makers quote deliveries of five to six months on large sizes and seven to nine months on small size non-defense items. It is admitted these deliveries will be further delayed if and when heavy munition tonnages are placed.

Over 70 per cent of last week's orders at one CHICAGO mill were for carbon bars to be shipped to an agricultural implement manufacturer. Railroad maintenance orders are very strong—and railroad spike purchases continue to pour in each week. Automotive interests are heavy takers of alloy bars, being the biggest single buying factor.

At CLEVELAND hot rolled bar tonnage in the past week was mostly routine, but pending large allocations for the defense program and the British, some of which are already tentatively scheduled, foreshadow a summer of exceptionally large production.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids on June 13 for 703 tons of nickel bar steel for the manufacture of chain for destroyers being built at the Boston Navy Yard.

Shipbuilding

. . . 123 more ships awarded . . . 521,000 tons of steel needed

The Maritime Commission on Monday contracted with nine shipbuilding companies for the construction of 123 ships to cost $312,000,000. About 521,000 tons of steel will be required for the vessels, which are to be of the commission's standard designs. At the same time the commission awarded contracts for eight shipways and other facilities to cost $6,000,000 and to be used for the construction of a portion of the new ships ordered.

Contracts for the 123 ships went to these companies: Ingalls Shipbuilding Corp., Pascagoula, Miss., six vessels of the Maritime Com-

mission's C-3 design; Federal Shipbuilding & Dry Dock Co., Kearny, N. J., 24 ships, C-2 design; Pennsylvania Shipyards, Inc., Beaumont, Tex., 10 ships, C-1 design; Pusey & Jones Corp., Wilmington, Del., 10 ships, C-1 design; Sun Shipbuilding & Dry Dock Co., Chester, Pa., 10 ships, C-2 design; Western Pipe & Steel Co., San Francisco, 17 ships, C-3 design; Seattle-Tacoma Shipbuilding Corp., Tacoma, Wash., 30 ships, C-3 design; Moore Dry Dock Co., San Francisco, 12 ships, C-2 design; Consolidated Steel Corp., Los Angeles, Cal., 4 ships, C-1 design.

Awards for shipyards and other facilities went to: Western Pipe & Steel Co., San Francisco, two ways; Moore Dry Dock Co., San Francisco, one way; Pusey & Jones Corp., Wilmington, one way; South Portland (Me.) Shipbuilding Corp., four ways.

Plates

. . . Ships, pipe lines and cars to take large tonnages

More than 500,000 tons of plates were allocated last week to various mills on the basis of their capacity for the latest addition to the merchant shipbuilding program. (See Shipbuilding in this section.) For a 24-in. pipe line to be built by oil companies from Texas to the Atlantic Coast more than 500,000 tons of plates will be required, as the pipe probably will be fabricated by the electric weld process by the A. O. Smith Corp., Milwaukee. It is understood that this tonnage will be awarded to plants having continuous mills, but there are only a few such mills which can roll plates wide enough. On top of these requirements there will probably be preference orders on plates and other steel for railroad car builders very shortly.

With such direct and indirect defense business being loaded on top of heavy commercial bookings, plate mills are jammed up tight and the only relief from the situation that can be seen is the imposition of mandatory priorities, which, it is believed in the steel trade, are coming soon. Every week that passes makes the situation more difficult for the plate mills in filling orders for non-defense purposes. Even shipyards are having difficulty in obtaining desired deliveries, while for the railroads the problem is even worse.

The request of the Central Iron & Steel Co., Harrisburg, Pa., to quote prices $5 a ton above the general market on plates has been granted by the Office of Price Administration and Civilian Supply. (See Prices in this section for details.)

Pig Iron

. . . Need for additional capacity is now being recognized

Whatever may be the recommendations of Gano Dunn in his report to President Roosevelt this week on iron and steel capacity, it is believed in the steel industry that at least a moderate number of new blast furnaces, possibly eight or 10, with be built during the next year.

The shortage of pig iron is becoming more apparent. The effort to get some of the old, idle furnaces back into blast is continuing. It is possible that a steel company will take over and operate the Delaware River furnace at Chester, Pa., and a project is also on foot to rehabilitate the old Central Iron & Coal Co. furnace at Holt, Ala., which is now owned by the Associated Metals & Minerals Corp., New York. This furnace has been idle since 1929 and the rebuilding would cost several hundred thousand dollars. It is understood that the furnace would be used for the production of ferromanganese. Coke would probably be furnished by Warrior River Coke Co., which will begin producing coke this week from the by-product ovens at Holt.

Pig iron production is being stepped up as rapidly as possible. Carnegie-Illinois Steel Corp. has 55 furnaces in blast out of a possible 59. This is the largest number of furnaces of this company in blast at one time in many years.

In order to keep as many foundries supplied as possible, some furnaces are splitting up shipments into single car lots. The difficulty which foundries are experiencing in obtaining cast scrap is making them more dependent on pig iron than usual.

The formal inquiry for 240,000 tons of low phosphorus and Bessemer pig iron required by the British is now being circulated. Deliveries would extend over five months. Another large inquiry comes from the Ford Motor Co., which wants 50,000 tons and is reported to be experiencing difficulty in placing the business owing to the extremely tight situation. The recent coal strike, which curtailed Ford's furnace operations, has increased the amount of iron the company will have to purchase from other producers.

CLEVELAND sellers continue shipping more than their stacks are producing, yet the necessity for workable inventories is greater than ever at blast furnaces, due to the fact that production losses are incurred when stacks are changed onto new analyses. More and more consumers are showing a desire for shipments above all else and are relaxing on specifications.

Tin Plate

. . . Consumption running well ahead of last year

Cold reduction tin plate mills continue at virtual capacity or slightly above. Mills are still studying the possible effect of the British tin plate requirements upon their own schedules. Domestic users are specifying heavily. The belief is still held that the British requirements, up to at least 26,000 tons a month, will be met in some way by American mills. Consumption of tin plate by leading can companies is running 20 per cent or higher than a year ago.

Prices

. . . Central permitted to charge 2.35c. on plates

The Office of Price Administration and Civilian Supply on Monday approved the application of the Central Iron & Steel Co., Harrisburg, Pa., to continue to charge its present price of 2.35c. at its usual basing points on plates. This is 25c. a 100 lb., or $5 a net ton, over the frozen price of 2.10c.

This is the second application allowed by OPACS to a small steel company to maintain prices in excess of those fixed by the steel order. Previously, the OPACS permitted the Phoenix Iron Co., Phoenixville, Pa., to continue its prices

of 2.30c. on shapes and 2.35c. on bars.

Other companies which have applied to OPACS to continue prices in excess of frozen levels are the Apollo Steel Co., Apollo, Pa.; Andrews Steel Co., Newport, Ky., and the Granite City Steel Co., Granite City, Ill. These applications are being considered by OPACS.

The OPACS is expected to hand down revisions this week in its April 17 steel price order. The commission with representatives of the steel industry has been working on proposed revisions and recommendations for several weeks and it is believed that many of the suggestions put forth by the steel industry calling for clarification and more equitable treatment have been acted upon favorably by OPACS.

It is expected that the effective date of the first steel pricing order will be moved up from March 31 to April 17.

Such a ruling, if promulgated, would let stand extra changes which were made effective after March 31 but before April 17, and would include such extra changes as galvanized pipe and wire nails.

For some time considerable discussion among steel makers concerning export prices has been prevalent and it is believed that the commission and the steel industry representatives have covered this point minutely. There is a definite possibility that the ceiling on export steel prices will coincide with the price schedules of the Steel Export Association of America if such an interpretation is put forth, certain premium prices which were prevalent before the price freezing order would have no chance of being reinstituted.

It is believed that some form of relief may be given steel companies on steel shipments from the East to Pacific and Gulf ports in view of the fact that much of this material will have to be shipped all rail.

Tubular Goods

. . . About 1,000,000 tons of line pipe pending

Activity in tubular products is reaching an all-time high. It is roughly estimated that inquiries for line pipe now in the market total around 2,000,000 tons, of which about 1,000,000 tons may be considered as defense projects. The remainder of the tonnage probably will not be able to find a place on mill books for some time to come.

Standard pipe demand reached an advanced tempo last fall, the rush of line pipe tonnage began in February, and in the past three weeks some anxiety has been in evidence among oil casing users who are placing business in substantial quantities. Line pipe tonnages without the defense angle are being turned down every day by pipe makers.

Action is expected soon on the 1500-mile 24-in. crude oil pipe line to run from Texas to New Jersey ports under the sponsorship of Standard Oil companies as well as other oil interests. This line, which is to replace transportation facilities, because of transference of oil tankers, is expected to be supplied by A. O. Smith Corp., Milwaukee. With an extra heavy wall, this pipe order will run more than 500,000 tons, and it is expected that a like plate order will be allocated among the larger steel companies with the definite possibility that high speed mills will have to produce the tonnage. Because of the national defense nature, the order is expected to get preferential treatment.

More than 350,000 tons of steel would be required if a contemplated 1600-mile 20-in. oil product line to run from Port Arthur, Tex., to New York City, is given governmental sanction. Texas Corp., Cities Service, and other oil companies are interested in this project which was originally set up as a 14-in. line, but recently was changed to 20 in. Only three large pipe makers are capable of producing this size, and allocation of this order may come soon.

Gulf Oil Corp. is actively inquiring for 500 miles of 10-in pipe which would require close to 50,000 tons of steel. The company has not disclosed the destination of the pipe line.

The pipe situation was further complicated this week when the British Purchasing Commission released approximately 70,000 tons of tubular product business which which was suspended a few months ago.

Owing to the shortage of zinc, orders for galvanized pipe are being sharply pared down by all producers.

Structural Steel

. . . Awards of 27,450 tons are above last week's

Fabricated structural steel awards total 27,450 tons compared with 22,200 tons last week. The largest lettings are 3660 tons at Brooklyn for the Long Island Railroad Atlantic Avenue improvements, Section 7; 3500 tons at the Philadelphia Navy Yard for tremie trusses; 3200 tons at Anniston, Ala., for an Army warehouse.

New structural steel projects of 19,850 tons compare with 10,200 tons a week ago. Sizable new jobs include 4000 tons for a brass rolling mill and case plant at CHICAGO for the Defense Plant Corp.

Reinforcing Steel

. . . Awards of 13,110 tons and inquiries for 8400 tons

Reinforcing steel awards of 13,110 tons include a pier project at the Mare Island Navy Yard, Cal.; 1327 tons at Wilmington, Cal., for a steam plant requirements; 1259 tons for a flood wall at Portsmouth, Ohio, and 1100 tons for a brass rolling mill and case plant at Chicago.

New reinforcing steel projects total 8400 tons. The only new job of size is 2860 tons for the Guyandotte flood wall at Huntington, W. Va.

Coke

. . . Ovens at Chester, Pa., to be reconditioned

Philadelphia Electric Co. has awarded a contract to Koppers Co. for the rehabilitation of its by-product coke plant at Chester, Pa., adjacent to the idle Delaware River Steel Co. blast furnace. The contract covers some 80 ovens which, when in operation, will produce about 350 tons of by-product coke daily. About six months will be required to get the ovens into operation.

Previous to the shutdown of the Delaware River blast furnace, these ovens provided fuel for its iron making operations. While no formal announcement has been made, it is believed that the Delaware unit will soon be put into operation by an EASTERN PENNSYLVANIA steel producer.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Big Aircraft Program Expected

New York

• • • **With the bomber program** being given first preference over other defense production, it is expected that Wright Aeronautical Corp. will soon launch another huge buying program. Tooling for a new and larger size motor may equal in number the whole of present manufacturing machinery at Paterson, and will probably get an A-1-a priority.

Although Washington reports in the daily press point to confusion in machine tool priorities, dealers here appear satisfied with present arrangements. Only in exceptional cases is deferment of old orders taking place, and there seems to be a better understanding of the system being used by OPM's priority committee.

Within the past 10 days, machine tool manufacturers have received a letter from Leon Henderson of OPACS asking that no further price increases be made in machine tools. This request affects so-called escalator clauses, some of which have already been dropped. One company, incidentally, on a limited line of which it is a large producer, upon delivery of such equipment has been making a rebate of 10 per cent in the last couple of months in line with reduced costs resulting from increased production lots.

Dealers here are busy filling out a lengthy questionnaire prepared by the House Naval Affairs Committee in order to determine the status of undelivered Navy orders. The questionnaire is primarily addressed to manufacturers and includes questions on costs and profits.

Labor Shortage a Problem

Cincinnati

• • • **While interest** in uncovering idle machinery in the southern Ohio district was stimulated by a conference the past week between the Defense Control Service representative and local machinery men, nothing of a tangible nature has been reported. Some machine tool executives indicate, that while it was probably true that there is idle machinery, this equipment is not available for use because companies owning the tools are without the skilled labor to operate them. One instance was reported of a small company normally employing about 15 skilled men is now only able to employ three, because of the drift of workers to the larger companies. The labor situation, of course, continues to be the big problem in stepping up production still further, although manufacturers in this area are now running at least 50 per cent ahead of last year, and by the time enlarged plants are in operation this summer, output will be close to double that of last year.

Production Being Increased

Cleveland

• • • **Plans now being evolved** indicate production at Cleveland by the end of this year will be up very sharply over the high level prevailing here now. It is likely also that sub-contracting will be widened considerably here by giving to sub-contractors parts that will better fit in with their existing production capacity.

Stepping up production in line with the vast buying program that Washington is talking about will require considerable machine tool equipment for machine tool producers. However, the jam on certain types in another six or eight months probably won't be as serious as it is right now and hence machine tool producers won't be competing for deliveries against various government departments to the same extent as at present.

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, May 27—The slow but steady growth of government control over the non-ferrous markets in the interest of expediting national defense was highlighted last week by announcement that the zinc emergency pool for June will be boosted to 22 per cent of April production, as compared with the May allotment of 17 per cent of March output.

Continuing conferences are being held between copper producers, users and the OPM and it appears now that it is only a matter of time before formal priorities are applied to the red metal distribution.

Market conditions in the past week were unchanged from the previous week with available metal being doled out on the basis of indicated needs at the unchanged prices of 12c. a lb., Valley, from producer sources, and 12½c. a lb. from smelters. A small amount of in-bond business was reported done at 11c. a lb., f.a.s., New York. Domestic copper sales for the current month through Saturday amounted to 69,180 tons, as compared with about 61,650 tons in the comparable period of April.

Zinc

The increase in June emergency pool indicates that some 15,000 tons of zinc will have to be set aside as compared with 12,000 tons in May. While theoretically this pool could be used to supply shortages among civilian users, it is unlikely that any important tonnages will be used for that purpose. Its practical effect is to withdraw 15,000 tons directly from the month's supply, thus further reducing amount of metal available for non-war work. This 15,000 tons does not represent total defense requirements, as substantial tonnages are being shipped for war work in the normal manner. Prime western quotations are unaltered at 7.64c. a lb., New York, and 7.25c., E. St. Louis.

Tin

Volume of tin purchased in the past week was not quite as heavy as in the preceding period, but daily sales are still averaging between 200 and 300 tons. Prices eased ⅛c. a lb. today, after holding at 52.25c., New York, the remainder of the week. Continued activity of the Navy in acquiring tin is leading many to believe that the Navy has taken up the acquisition of tin for stock piles, while the Metals Reserve Co. is temporarily unable to proceed while market quotations exceed its buying price of 50c.

Lead

Stocks of refined lead dropped 3097 tons in April to 42,899 tons, according to the American Bureau of Metal Statistics, the sharpest decline in many months. The loss in reserves was due to the fact that, although shipments showed a small decline, production dipped much further. Refined production in April was 56,086 tons, against 61,503 tons in March, while April shipments amounted to 59,169 tons as compared with 62,090 tons in the preceding month. The statistics also revealed that domestic refined production is now dependent upon foreign ores for 42 per cent of its monthly refined output. Marketwise, the situation is unchanged, with the heavy demand being limited only by restrictions applied by sellers. June requirements are now estimated to be about 65 per cent covered. Prices are unchanged at 5.85c. a lb., New York, and 5.70c., St. Louis.

Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

The scrap supply situation continues to grow progressively more difficult. Movement of material in the past week, the third week of operation under the new ceiling prices, saw shipments falling sharply behind consumption. Some mills were successful in building up substantial stocks previous to the May 10 deadline, but these reserves are being rapidly depleted and a number of mills are reported to be seriously concerned over the possibility of being unable to maintain the present high rate of steel production unless shipments of scrap are quickly stepped up.

Another new factor injected into the scrap situation is that of supplying material for Britain. The Treasury Department is currently taking bids on 75,000 tons and it is believed that British requirements over the remainder of the year will total close to 360,000 tons. Material on which the Treasury is taking bids has tentatively been allocated at prices somewhat above the export maxima set in the May 7 price order. Ports of shipment specified in the bids are Portland, Me.; Boston, New York, Philadelphia, Baltimore, Norfolk and Savannah. Disinclination to use Gulf ports is said to be due to time element involved.

Domestic mills fear efforts to draw this scrap from areas supplying domestic consumers will further aggravate the already tight situation. It has been suggested that material could be barged from Gulf ports, where it does not compete with domestic mills, to various South Atlantic ports.

Clarification of certain phases of the May 7 price schedule are given on following page. THE IRON AGE composite is unchanged this week at $19.17.

Pittsburgh

Trading is still restricted here and actual transactions involve small amounts. Brokers are not going short but are able to dispose easily of any material picked up. Either because of lack of clarification of the recent scrap order or because shipments prior to May 10 cleaned up all available supplies, scrap is not coming out to a degree satisfactory to consumers. OPACS is expected to clarify page 5 of appendix A of the May 7 schedule which permitted consumers to absorb up to $1 additional freight, provided he were not located at a consuming point listed in the schedule. It is understood this freight absorption applies to consumers at all points and this intent was so interpreted by many brokers when the order was issued.

Philadelphia

Scrap supply situation here is growing progressively worse. The current rate of shipments is estimated at about 50 to 60 per cent of actual consumption needs. While most district mills, anticipating the present situation, built up fairly substantial stocks in April, these reserves are fast disappearing and several mills are very low on supplies. A small lot of Cuban scrap has been offered to domestic users at between $13 and $14 a ton, f.a.s., Havana. This, however, would result in a delivered price above present maximum and mills have been unable to obtain permission to exceed the ceiling for this material. Possibility of export shipments from areas feeding this district has given rise to serious fears that this will still further aggravate the tightness. Cast scrap is flowing at a slightly better pace than a week ago, but is still below required volume. Industrial scrap, which is moving in substantial tonnage, is now chief mainstay of this district.

Chicago

According to reports, the biggest mill in this district bought about 20,000 tons of various grades last week. Most mills came into the market with open orders as trades were confined to small tonnages. Dealers are shipping a car of scrap as they get it prepared and it is extremely difficult to get sizable tonnages. Railroads are still hesitant about selling, one road has had a list open for two weeks, finally sent its bids to Washington for advice. Clarification is still the pressing need. For instance, a selling point in Kansas has a freight rate of $3.36 to Kansas City and $5.60 to Chicago. Yet No. 1 steel is only $16 at Kansas City and $18.75 here, which means a higher price in Chicago despite the higher freight rate. Some scrap is being brought in from the Southwest to bolster supplies.

Youngstown

A change permitting use of the $1 freight differential on listed points as well as unlisted points will probably give more relief to mill buyers and open up more territory for them to work in, it is believed here. Getting scrap for Warren and Youngstown has been increasingly difficult due to the inability to enter flush markets.

Cleveland

As the result of countless "vest pocket" agreements and numerous interpretations from Washington tending to liberalize the scrap price regulations, there is more hope this week that a better volume may be obtained for both steel mills and foundries. Complaints continue to center on alleged disregard for specifications. Carloads have been directed here and there by Washington to help keep vital foundry production going. A $1.65 differential between Detroit and Cleveland on cast scrap is believed likely hereafter.

Cincinnati

Scrap dealers in southern Ohio continue confused and cautious. Efforts to ascertain whether Cincinnati is considered a basing point have brought contradictory answers as result of which dealers are only buying and selling on a basis clearly within the government rulings. Dealers' supplies are fairly low as result of heavy shipments earlier in the month, but they are not too enthusiastic in replenishing, primarily because producers are apathetic toward present quotations. So far, mills in the area are in apparently good shape, and so no pressure has yet been exerted from this source.

Detroit

There is some sag in scrap transactions, possibly while new accumulations are made after the clearing up of old contracts. Cast iron is still extremely difficult to obtain and foundries are reportedly beginning to be squeezed. Establishment of a $1 differential on a territorial basis is feared in some quarters as a possible incentive to raiding. Automotive lists closing the end of this month may prove a test of this theory. Incidentally, automotive scrap is coming out in unabated quantities, a condition unusual for this season of the year but explained by the fact that auto builders are keeping their schedules at record heights and turning out more cars than at any period since the spring of 1937. Dealers' buying prices today are unchanged from those quoted in THE IRON AGE on May 8, and continue effective pending any change in the local market.

New York

Confusion continues to rule here among dealers and brokers. For another week deliveries to yards, especially of collectors' scrap, were scarce and insufficient, although one or two brokers described them as fair. Others appeared to think that a real shortage exists here and that the quantity of material available is insufficient to satisfy continued heavy demands.

Toronto

Consumption of iron and steel scrap on a much broader scale is indicated for the Canadian markets. Dominion Steel & Coal Corp. is said to be seeking much greater tonnages for immediate use and will be heavier buyer later in the year. Arrangements are underway which will absorb most of the British Columbia and Alberta scrap and collectors are starting a campaign of accumulation. Demand for both steel and iron grades is jumping rapidly in the Toronto and Montreal areas, and dealers report no surplus stocks. Plans are underway for sharp increase in imports from the United States.

Scrap Schedule To Be Clarified

Clarification of some of the ambiguities and inequalities of the present iron and steel scrap price schedule is being undertaken by the Office of Price Administration and Civilian Supply in conferences with representatives of scrap dealers and users. Meanwhile, the Office of Production Management has formed an advisory committee consisting of five scrap suppliers and three scrap users to advise the agency on various problems relating to supplies.

Members of this committee are C. A. Ilgenfritz, Republic Steel Corp.; R. W. Wolcott, Lukens Steel Co.; W. W. Macmillen, National Malleable & Steel Castings Co., Cleveland; Louis J. Borinstein, of A. Borinstein, Indianapolis; E. L. Solomon, Max Solomon Co., Pittsburgh; Joel Claster, Luria Brothers & Co., Inc., Philadelphia, and J. D. Wohl, Jaffe-Wohl Iron & Metal Co., Birmingham, and L. Dulien, Dulien-Steel Products, Inc., Seattle.

This new committee has authority only to consult with and make recommendations to government agencies.

Among the problems to be considered by this committee are scrap priorities, the transportation factor in attempting to reach remote scrap, and whether or not scrap should be included in the OPM general metal order No. 1 relating to inventories. In the event that scrap is not added to the general metals order No. 1, the government will still have complete details on scrap stocks and shipments through monthly reports now required by OPM (section 10, price schedule No. 4).

Meanwhile, in meetings with OPACS, scrap consumers and sellers have been discussing a series of recommendations concerning such matters as grade descriptions, particularly with reference to cast material, district differentials and water against rail shipments.

One of the questions posed by the scrap price schedule was whether or not the $1 differential applied to consumers *in* a district, as well as those outside the consuming point area. It is now understood that all consumers are permitted to use this $1 to equalize any inequalities on freight or switching charges which may exist *inside* a consuming point, as well as outside.

An authoritative interpretation of this point is as follows: On page 5 of Appendix A of the price schedule of May 7 provision was made to permit a consumer to absorb up to $1 additional freight provided he was not located at a consuming point listed in the schedule. This springboard of $1 now applies to consumers at all points. Except for a reservation noted below, the origin point of scrap continues to be computed by subtracting the freight from the nearest consuming point. This origin point price may never be exceeded. But a consumer located in another consuming district may purchase this scrap provided the sum at the origin point price and the actual transportation does not exceed by more than $1 his established ceiling. It should be thoroughly understood that the origin price may never be exceeded and the additional $1 is only for freight. There may be points at which the delivered price may be under the ceiling. This springboard does not apply to purchases by Birmingham west of the Alabama line which the schedule already provides for a differential of $1.

An example of this situation is where, for instance, two Pittsburgh mills may have switching rates of 55c. and 89c. respectively. The origin point price would be determined by the lowest rate (55c.) while the mill with the 89c. rate would be permitted to absorb 34c. freight out of the $1 springboard clause.

Consumers and dealers in New England have urged that in their district the origin point price be construed not on the basis of the nearest consuming point, as at present, but on the basis of the most advantageous shipping point price. Although it is understood that OPACS officials are favorable toward this exception in New England, no formal ruling had been issued up to the time of going to press.

The following is the approved method of computing delivered prices to foundries located outside a listed basing point area: The nearest consuming point to the location of the scrap is taken, less the transportation costs to arrive at an f.o.b. origin point maximum. The foundry then computes its delivery price by adding either the rail freight, the trucking costs, or any combination of rail and trucking costs, to establish the delivered price.

A foundry outside a basing point may have as many different maximum prices as it has regular sources of supply, if each source is in a different city.

Maximum price for short rails in the New Jersey area, for example, would be the nearest consuming point price, which is Philadelphia, at $23.50 less transportation charges from Philadelphia to the New Jersey point. This presumes that the rails originate, as well as are consumed, in Philadelphia.

Colvin-Stanley Book Tells How to Run Machine Shop

• • • **"Running a Machine Shop"** is the title of a new book by Fred H. Colvin and Frank A. Stanley, authors of American Machinists' Handbook and many other books on machine shop practice. This book differs from others written by these men in that it is largely a compendium of specific experiences in designated plants regarding methods of shop layout, equipment, production and personnel management, taken from both large and small shops. Much of the material was abstracted from recent articles in the technical press. As a result of this treatment, the subject matter is not too well organized, and is not suitable as a textbook, but it has the advantage of citing actual examples rather than a neat array of principles.

Chapters relate to planning, selection of shop equipment (principles only), material handling methods, toolrooms and tool cribs (one of the best sections in the book), work scheduling, estimating, apprentice training, foremen and personnel relations, inspection systems, and "management," the last being a sort of catch-all chapter. The book has just been published by the McGraw-Hill Book Co., New York, and is priced at $3.50. It contains 450 pages.

Construction Steel

. . . STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings of 27,450 tons compare with 22,200 tons last week; new projects advance to 19,850 tons from 10,200 tons a week ago; plate awards only 590 tons.

AWARDS

NORTH ATLANTIC STATES

3660 Tons, Brooklyn, Atlantic Avenue improvement, Long Island Railroad, section 7, to American Bridge Co., Pittsburgh.

3500 Tons, Philadelphia, tremie trusses for Navy Yard, to Bethlehem Steel Co., Bethlehem, Pa.

2500 Tons, Everett, Mass., Edison Electric Illuminating Co. of Boston, power plant, Thomas O'Connor Co., Boston, contractor.

850 Tons, Schenectady, N. Y., building No. 16 for General Electric Co., to Lehigh Structural Steel Co., Allentown, N. Y.

450 Tons, New Cumberland, Pa., buildings, quartermaster staff, to Anthracite Bridge Co., Scranton, Pa.

435 Tons, New York, Harlem Hospital building, to Schacht Steel Construction Co., New York.

240 Tons, Curtis Bay, Md., United States Coast Guard administration and shop building, to an unnamed fabricator.

225 Tons, Quonset Point, R. I., seaplane nose hangars, to Lehigh Structural Steel Co., Allentown, Pa.; George A. Fuller Co. and Merritt-Chapman & Scott Corp., New York, contractors.

150 Tons, Philadelphia, power house addition, Navy Yard, to Frank M. Weaver Co., Lansdale, Pa.

145 Tons, Fort Covington, N. Y., State bridge RC-41-14, to American Bridge Co., Pittsburgh.

130 Tons, Curtis Bay, Md., dock shed-ordnance depot, to Belmont Iron Works, Philadelphia.

120 Tons, Marcy, N. Y., State bridge RC-41-8, to American Bridge Co., Pittsburgh.

100 Tons, Warren County, N. Y., South Horicon River bridge, to American Bridge Co., Pittsburgh.

THE SOUTH

3200 Tons, Anniston, Ala., warehouses for Army, to Ingalls Iron Works Co., Birmingham.

1400 Tons, Charleston, S. C., shop fitter's building and layout shed, to Carolina Steel & Iron Co., Greensboro, N. C., and Virginia Bridge Co., Roanoke, Va.

425 Tons, Emco, Ala., machine shop and stores building for Electro-Metallurgical Co., to Bethlehem Steel Co., Bethlehem, Pa.

250 Tons, Berwick-Morgan City, La., raising Berwick Bay bridge for Texas & New Orleans Railway, to American Bridge Co., Pittsburgh.

200 Tons, Covington, Ky., Woolworth store, to Bethlehem Steel Co., Bethlehem, Pa.

135 Tons, Coldwater, Miss., bridge for Illinois Central System, to American Bridge Co., Pittsburgh.

CENTRAL STATES

2300 Tons, St. Louis, American Can Co. factory, to American Bridge Co., Pittsburgh.

1250 Tons, Hines, Ill., Edward Hines Veteran Hospital building, to Gage Structural Steel Co., Chicago.

1250 Tons, Patterson Field, Ohio, two warehouses for Army, to Bethlehem Steel Co., Bethlehem, Pa.

800 Tons, Richland County, Ohio, two bridges, to American Bridge Co., Pittsburgh.

500 Tons, Akron, addition to brake and wheel building for Goodyear aircraft plant to Bethlehem Steel Co., Bethlehem, Pa.; this in addition to 600 tons previously reported.

450 Tons, Kingsbury, Ind., load line buildings for ordnance plant, to Mississippi Valley Structural Steel Co., St. Louis.

350 Tons, various locations, beam spans, for Chicago & North Western Railroad Co., to American Bridge Co., Pittsburgh.

200 Tons, Detroit, addition to Kercheval power plant for Chrysler Corp., to Whitehead & Kales Co., Detroit.

175 Tons, various locations, beam spans, for Milwaukee Road, to American Bridge Co., Pittsburgh.

130 Tons, Cincinnati, Ohio, Lincoln Court housing project, to American Bridge Co., Pittsburgh, and Case, Crane & Kilbourne-Jacobs Co., Columbus.

WESTERN STATES

1100 Tons, Lathrop, Cal., San Joaquin River bridge for Southern Pacific Co., to American Bridge Co., Pittsburgh.

270 Tons, Fort Lewis, Wash., hangar and boiler plant, to Paxton & Vierling Iron Works, Omaha, Neb., through Sound Construction & Engineering Co., Seattle, contractor.

200 Tons, Los Angeles, shipyard craneway, to Isaacson Iron Works, Seattle.

172 Tons, Los Angeles, Higuera Street bridge, to Consolidated Steel Corp., Los Angeles, through W. J. Disteli, Los Angeles, contractor.

150 Tons, Seattle, craneways, Seattle-Tacoma Shipbuilding Corp., to Isaacson Iron Works, Seattle.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

1200 Tons, Dauphin City, Pa., court house.

1200 Tons, Middletown, Pa., airplane repair dock.

825 Tons, New York, reconstruction, Melrose Avenue State bridges.

500 Trafford, Pa., foundry extension for Westinghouse Electric & Mfg. Co.

500 Tons, Tonawanda Township, N. Y., factory building for Linde Air Products Co.; bids June 3.

400 Tons, Niagara Falls, N. Y., substations for Niagara Falls Power Co.

320 Tons, Essington, Pa., light machine shop extension, for Westinghouse Electric & Mfg. Co.

250 Tons, Syracuse, N. Y., field artillery armory, bids rejected; may ask bids later.

200 Tons, Landover, Md., Pennsylvania Railroad. State overpass.

160 Tons, Richmond, Mass., State bridge.

152 Tons, Springfield, Mass., Westinghouse Electric & Mfg. Co., alterations to L building.

130 Tons, Denville, N. J., highway project, route 6, section 21A, readvertisement.

THE SOUTH

1500 Tons, Louisville, Ky., neoprene plant, E. I. du Pont de Nemours Co.

525 Tons, Norton, W. Va., Tygart River State bridge.

175 Tons, Elkins, W. Va., State bridge.

CENTRAL STATES

4000 Tons, Chicago, brass rolling mill for Defense Plant Corp.

3300 Tons, Rock Island, Ill., Rock Island arsenal warehouse.

940 Tons, Massillon, Ohio, flood control project; new bids June 21.

475 Tons, La Porte, Ind., buildings, Kingsbury ordnance plant for government.

430 Tons, Austin, Ind., two State bridges, Nos. 2172, 2173.

350 Tons, Farmland, Ind., State bridge No. 2165.

340 Tons, Proving Ground, Ill., government materiels storehouse, ordnance depot.

300 Tons, South Chicago, Ill., mill building for Republic Steel Corp.

310 Tons, Cleveland, office building for Defense Plant Corp.

200 Tons, Cleveland, office building for Cleveland Pneumatic Tool Co.

200 Tons, Lacarne, Ohio, six buildings for Erie Proving ground; bids May 29.

180 Tons, Pacific Junction, Iowa, State bridge FAGH-842-B.

165 Tons, Worthington, Minn., State bridge.

155 Tons, Long Point, Iowa, State bridge FAS-521.

125 Tons, Peoria, Ill., Jefferson office building addition for Illinois Bell Telephone Co.

WESTERN STATES

103 Tons, Norwood, Colo., San Miguel River bridge; bids June 3.

102 Tons, Denver, East 40th Avenue overpass; bids June 3.

100 Tons, Reno, Nev., University of Nevada gymnasium; bids June 6.

FABRICATED PLATES

AWARDS

590 Tons, Philadelphia, 30-in. plate cylinders, dry docks No. 4 and 5, Navy Yard, to Bethlehem Steel Co., Bethlehem, Pa.

SHEET PILING

PENDING PROJECTS

428 Tons, Massillon, Ohio, flood control project. New bids June 21.

Weekly Bookings of Construction Steel

Week Ended ——→	May 27, 1941	May 20, 1941	Apr. 29, 1941	May 28, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	27,450	22,200	42,550	18,000	674,860	301,680
Fabricated plate awards	590	450	15,100	4,030	68,155	59,125
Steel sheet piling awards	0	0	0	250	16,755	16,440
Reinforcing bar awards	13,110	5,350	29,535	5,800	279,400	168,250
Total Letting of Construction Steel	41,150	28,000	87,185	28,080	1,039,170	545,495

Reinforcing Steel

Awards of 13,110 tons; 8,400 tons in new projects.

AWARDS

ATLANTIC STATES

600 **Tons,** Everett, Mass., General Electric Co. plant, to Bethlehem Steel Co., Bethlehem, Pa.

390 **Tons,** bars and mesh, Weathersfield, Conn., State road; bars to Truscon Steel Co., Boston, and mesh to American Steel & Wire Co., Worcester, Mass.

360 **Tons,** Pine Camp, N. Y., mesh for pavement project, to Truscon Steel Co., Youngstown, through John W. Cowper, Inc., Buffalo, and Senior & Palmer, Inc.

300 **Tons,** Brooklyn, Navy Yard foundry, to Joseph T. Ryerson & Son, Inc., Chicago; Thompson-Starrett Co., contractor.

270 **Tons,** bars and mesh, Beacon Falls, Conn., State road; 100 tons bars to Truscon Steel Co., Youngstown, 170 tons mesh to American Steel & Wire Co., Worcester, Mass.

200 **Tons,** Maplewood, N. J., Public Service of New Jersey to Truscon Steel Co., Youngstown; Beakman Wells, Jersey City, contractor.

140 **Tons,** Sutton, Mass., State highway and two bridges, to Concrete Steel Co., Boston, through C & R Construction Co., Roslindale, Mass., contractor.

127 **Tons,** Revere-Saugus, Mass., State bridge, to Northern Steel Co., Boston, through G. Rotondi & Sons, Melrose, Mass., contractor.

100 **Tons,** Corning, N. Y., building for Corning Glass Co., to Bethlehem Steel Co., Bethlehem, Pa., through H. K. Ferguson Co., Cleveland.

SOUTH AND CENTRAL

1259 **Tons,** Portsmouth, Ohio, flood wall, unit 2, U. S. Engineers, to West Virginia Rail Co., Huntington, W. Va.; Charles D. Smith, contractor.

1100 **Tons,** Indianapolis, brass rolling and case plant for Bridgeport Brass Co., to Truscon Steel Co., Youngstown, through Stone & Webster Engineering Corp.

969 **Tons,** Anniston, Ala., sub-structure for igloos, to Truscon Steel Co., Youngstown, through Dunn Construction Co. and John Hodgson Co.

800 **Tons,** Stickney, Ill., sewage treatment works, division P, to Olney J. Dean Steel Co., Chicago; Casey & Emmert, contractor.

600 **Tons,** Dubuque, Iowa, substructure, Mississippi River bridge, to Bethlehem Steel Co., Bethlehem, Pa.; Fred J. Jones, contractor.

600 **Tons,** St. Joseph, Mo., factory and warehouse, Western Tablet Co., to Sheffield Steel Corp., Kansas City, Mo.

441 **Tons,** Louisville, Ky., requirements of Louisville Gas & Electric Co., at Paddy's Run Siding, to Truscon Steel Co., Youngstown.

260 **Tons,** Detroit, factory and offices, Metal Moulding Co., to Joseph T. Ryerson & Son, Inc., Chicago; Cooper Construction Co., contractor.

250 **Tons,** Roanoke, Va., municipal stadium, to Virginia Steel Co., Richmond, Va.; Blackwell Engineering Co., contractor.

170 **Tons,** Hamilton County, Ohio, mesh for State project No. 21, to Truscon Steel Co., Youngstown, through Cincinnati Builders Supply Co.

168 **Tons,** Flint, Mich., grade separation, to Bethlehem Steel Co., Bethlehem, Pa.; Hamer Brothers, contractor.

132 **Tons,** Delaware County, Ohio, mats for State project No. 26, to Truscon Steel Co., Youngstown, through Christ & Beatty.

120 **Tons,** Detroit, Continental Motor Co. test building, to Taylor & Gaskin, Inc., Detroit; F. H. Martin, contractor.

100 **Tons,** Macomb County, Mich., Chrysler Corp. tank proving grounds, to Bethlehem Steel Co., Bethlehem, Pa.; O. W. Burke, contractor.

100 **Tons,** Wyandotte, Mich., Goodwin, Inc., store, to McRae Steel Co., Detroit; A. O. Misch contractor.

100 **Tons,** Columbus, Ohio, bars and mesh for State project No. 27, to Truscon Steel Co., Youngstown, through L. L. Clymer Co., Bluffton, Ohio.

WESTERN STATES

2000 **Tons,** Mare Island, Cal., Navy Yard pier project, to Truscon Steel Co., San Francisco, through Henry J. Kaiser Co., Oakland, Cal., contractor.

1327 **Tons,** Los Angeles, Cal., requirements of Wilmington steam plant for city, to Truscon Steel Co., Youngstown.

125 **Tons,** Covington, Wash., Bonneville Power Administration substation, to Seattle Steel Co., Seattle, through C. F. Davidson, Tacoma, Wash., contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

950 **Tons,** Binghamton, N. Y.; flood protection, section 4.

600 **Tons,** Brooklyn, superstructure, Fort Greene housing project.

500 **Tons,** New York, Murray Hill High School; Caristo Construction Co., contractor.

100 **Tons,** Denville, N. J., highway project, route 6, section 21A; readvertisement.

South and Central

2860 **Tons,** Huntington, W. Va., U. S. Engineer, Guyandotte flood wall.

500 **Tons,** Cairo, Ill., flood protection wall; bids June 5.

500 **Tons,** Carbondale, Ill., sewage plant, WPA 56385.

400 **Tons,** Skokie, Ill., Searle Co., laboratory and manufacturing building.

300 **Tons,** Wayne County, Mich., Sisters of Good Shepherd buildings; W. E. Wood Co., contractor.

300 **Tons,** Quincy, Ill., two housing developments; bids taken.

250 **Tons,** Dearborn, Mich., Ford airplane assembly plant.

100 **Tons,** Massillon, Ohio, flood control project; new bids June 21.

WESTERN STATES

567 **Tons,** Friant, Cal., Central Valley project (Invitation 48,828-A); bids in.

450 **Tons,** Sacramento, Cal., Helvetia low rent housing project; Campbell Construction Co., Sacramento,, contractor.

Cast Iron Pipe

Chauncey, Ohio, will begin work soon on pipe lines for water system and other waterworks installation, including reservoir and water-treatment plant. Cost about $215,000. Financing has been arranged through Federal aid. J. J. Morgan, 255 East Broad Street, Columbus, Ohio, is consulting engineer.

Woodstock, Ill., will take bids soon for pipe lines for water system and other waterworks installation, including elevated steel tank on steel tower. Cost about $50,000. Alvord, Burdick & Howson, 20 North Wacker Drive, Chicago, are consulting engineers.

Le Claire, Iowa, asks bids until June 9 for pipe lines for water system and other waterworks installation. Cost about $30,000.

Oxford, Miss., closes bids June 12 for 250 ft. of 10-in. pipe with fittings, valve boxes, etc.; also for two motor-driven pumping units, each with capacity of 750 gal. per min., with motors, controls, starting equipment and accessories.

Mobile, Ala., has engaged J. B. Converse & Co., Wilson Building, consulting engineers, to make surveys and plans for proposed extensions and replacements in water pipe lines, including pumping stations, impounding reservoirs, water-treatment plant and other equipment. Cost about $1,600,000.

Melcher, Iowa, asks bids until June 18 for pipe lines for water system, water storage tank and other equipment. Cost about $30,000. Ralph W. Gearhart, 349 Twenty-first Street, S. E., Cedar Rapids, Iowa, is consulting engineer.

Board of County Commissioners, Warren, Ohio, plans pipe line extensions in water system in different parts of County; also new sanitary sewer lines. Harry L. Dittmer is County engineer.

San Antonio, Tex., plans 8 to 16-in. pipe for extensions and replacements in main water lines. Cost close to $100,000. Water Board, 108 West Market Street, in charge.

Los Angeles Department of Water and Power will take bids June 2 for 55,000 ft. of 12-in. inside diameter and 6600 ft. of 16-in. inside diameter bell and spigot cast iron pipe (Specifications 3785).

Glendale, Cal., has awarded class 250 pipe as follows: 6000 ft. of 6-in., 5000 ft. of 8-in., and 1000 ft. of 12-in. to United States Pipe & Foundry Co.; 2000 ft. of 16-in. and 1000 ft. of 24-in. to American Cast Iron Pipe Co., Los Angeles.

Pipe Lines

United States Engineer Office, Post Office and Court House Building, Baltimore, asks bids until June 9 for pressure pipe lines for gasoline fueling system at municipal airport, Harrisburg, Pa., including storage tanks and auxiliary equipment

Pacific Gas & Electric Co., 245 Market Street, San Francisco, is completing surveys for new welded steel pipe line from Kettleman Hills gas field area to Fresno, Cal., about 55 miles, for natural gas transmission, and will carry out work during summer. Cost over $750,000 with compressor stations and other operating facilities.

Glenmora, La., will take bids soon for pressure pipe line system for municipal natural gas distribution, including main welded steel pipe line for connection with supply source, control station and other facilities. Bond issue of $60,000 has been authorized for project. F. P. Joseph, Glenmora, is consulting engineer.

Bureau of Reclamation, Denver, asks bids until June 16 for two 102-in. diameter welded steel penstocks, with 84-in. diameter reducers, and 50-in. diameter outlet pipe branches for Green Mountain dam, Colorado-Big Thompson project, Colo. (Specification 964).

General Purchasing Officer, Panama Canal, Washington, asks bids until June 2 for 13,200 ft. of welded carbon steel pipe (Schedule 5129); until June 6 for 10, 8 and 6-in. standard seamless black steel pipe, with elbows, tees, flanges and other fittings (Schedule 5143).

Southern Natural Gas Co., Watts Building, Birmingham, plans extensions in main welded steel pipe lines for natural gas transmission, about 125 miles in all. Cost estimated at $2,880,000. Also will install new compressor stations for booster service in connection with new lines, approximating 17,300-hp., gross, to cost about $1,617,000. Financing is being arranged through security issues. C. P. Rather is president.

Mississippi River Commission, Vicksburg, Miss., asks bids until June 3 for 25 lengths of spiral riveted or welded steel pipe, with 72 black welding flanges and fittings (Circular 23).

Nickel Steel Inventory Control Reports Simplified

Washington

• • • **Simplifying the** task of consumers of nickel steel, the OPM inventory control order has been modified so that bar stocks of the same specifications can be lumped in making reports of inventories. Supplies of stainless and alloy steel will be reported separately but it is no longer necessary to report on individual sizes of the various items.

Shell Steel Section Added to OPM Unit

• • • **A new section on** shell steel and bars has been added to the OPM steel unit. The new section will have the same general functions as other sections of the steel unit and will have charge of allocations of shell steel and bars. Conferences will be held with the Steel Industry Defense Committee and allocations arranged.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extas, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, MFG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pitsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C...	$6.00	$12.00
15-lb. coating I.C...	7.00	14.00
20-lb. coating I.C...	7.50	15.00
25-lb. coating I.C...	8.00	16.00
30-lb. coating I.C...	8.63	17.25
40-lb. coating I.C...	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	65½
9/16 and ⅝ in. by 6 in. and shorter	63½
¾ to 1 in. by 6 in. and shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65
Nuts, cold punched or hot pressed, hex. or square:	
½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose 71 and 10

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pitsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws *Per Cent Off List*

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap screws, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	May 21	May 22	May 23	May 24	May 25	May 26
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York[2]	52.25	52.25	52.25	....	52.25	52.125
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.70	5.70	5.70	5.70	5.70	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

Tin	New York	Cleveland
Straits pig	52.75	55.00
Copper		
Electro	13.00	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	Nom'al	Nom'al
Lead		
American pig	6.85	6.35
Bar	8.70	8.85
Cut sheets	9.00	91.0
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt, 98-99%	18.00	18.50
Solder		
½ and ½	32.00	32.75
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	10.625	11.25
Hvy. and wire	9.625	10.025
Light and bottoms	8.625	9.125
Brass		
Heavy	6.125	6.625
Light	5.125	5.875
No. 1 yel. turn	5.875	6.375
No. 1 red or compo. turnings	9.375	10.375
Hvy. Mach. compo	9.625	9.850
Lead		
Heavy	5.00	5.50
Aluminum		
Cast	11	00-12.00
Sheet	12	.00-13.50
Zinc		5.10

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $180-$182. per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade .....2.70c.
Delivered, Detroit .....2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.

Open hearth grade .....3.50c.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

20% Chromium-Nickel Clad Steel

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37,35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	33
¼ to ⅜ in.	59	40½
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron		
¼ and ⅜ in.	+9	+33
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Lap Weld

Steel		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
7 and 8 in.	65	52½
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
9 to 12 in.	28½	12

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	38½
¼ to ⅜ in.	56½	42½
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron		
¼ and ⅜ in.	+10	+46
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
7 and 8 in.	65½	53
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21
7 and 8 in.	38½	21½
9 to 12 in.	32	17½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Grosss Ton

Old range, bessemer, 51.50%.. $4.75
Old range, non-bessemer, 51.50% 4.60
Mesaba, bessemer, 51.50%.... 4.60
Mesaba, non-bessemer, 51.50% 4.45
High phosphorus, 51.50%..... 4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Per Unit

African, Indian, 44 to 48% Mn. 57c. to 61c.
African, Indian, 49 to 51% Mn. 60c. to 65c.
Brazilian, 46 to 48% Mn...54c. to 59c.
Cuban, del'd, duty free, 51% Mn. 67½c. to 71c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered....$23 to $24
Tungsten, domestic, scheelite, delivered $23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton; South African (low grade)..... Nom.
Rhodesian, 45% $25.00
Rhodesian, 48% ...$28.00 to $30.00

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton.....$40.00
Angle bars, 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets), gross ton $40.00
Light rails (from rail steel), gross ton 39.00

Base per Lb.

Cut spikes ..... 3.00c.
Screw spikes ..... 4.55c.
Tie plates, steel ..... 2.15c.
Tie plates, Pacific Coast..... 2.30c.
Track bolts, steam railroads... 4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts).... 65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges .....20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines....20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.... 31.00
As above, in bags, f.o.b. same mines 32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*

Super-duty brick at St. Louis..$60.80
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 47.50
First quality, New Jersey..... 52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri, and Illinois 42.75
Second quality, New Jersey.... 9.00
No. 1 Ohio..... 39.90
Ground fire clay, per ton..... 7.10

Silica Brick

Pennsylvania $47.50
Chicago District 55.10
Birmingham 47.50
Silica cement, net ton (Eastern) 8.55

Chrome Brick *Net per Ton*

Standard f.o.b. Baltimore, Plymouth Meeting and Chester...$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.

Magnesite Brick

Standard f.o.b. Baltimore and Chester $72.00
Chemically bonded, f.o.b. Baltimore 61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....(—)*
Domestic, f.o.b. Baltimore and Chester in sacks.....$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00

*None available.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% $36.00
Domestic, 26 to 28% 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered Lump Size

50% (carload lots, bulk) $74.50*
50% (ton lots, packed) 87.00*
75% (carload, lots, bulk) 135.00*
75% (ton lots, packed) 151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50% $34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50% $28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon .....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C. f.o.b. furnace carload and contract, per net ton.....$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C. f.o.b. furnace, carload and contract per net ton.....$157.50

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24% per gross ton, $3 unitage, freight equalized with Nashville 75.00

Ferromolybdenum, per lb. Mo., f.o.b. furnace ..... 95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.

Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.....4.90c.
No. 6, f.o.b. Bayonne, N. J.....3.21c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds., del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland..5.75c.
No. 4 indus., del'd Cleveland...5.375c.
No. 5 indus., del'd Cleveland...5.125c.
No. 6 indus., del'd Cleveland...4.875c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt .....$6.00 to $6.25

Foundry, f.o.b. Connellsville, prompt .....$6.75 to $7.00

F'dry, by-product, Chicago..... 10.50

F'dry, by-Product, New England 13.75

Foundry, by-product, Newark or Jersey City .....$12.45 to 12.95

F'dry, by-product, Philadelphia. 12.13

F'dry, by-product, Cleveland... 12.30

F'dry, by-product, Cincinnati... 11.75

Foundry, Birmingham 8.50

F'dry, by-product, St. Louis $10.75 to $11.00

BRITISH

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export £29 16s. 3d.

Tin plate, per base box. 32s. to 33s.

Steel bars, open hearth..£16 10s.

Beams, open hearth....£19 10s.

Channels, open hearth...£19 10s.

Angles, open hearth....£15 10s.

Black sheets, No. 24, gage £22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage £25 12s. 6d max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$25.50***	***$25.00***	***$26.50***	***$26.00***	.....
Brooklyn	***27.50***	.....	.....	***28.00***	.....
Jersey City	***26.53***	***26.03***	***27.53***	***27.03***	.....
Philadelphia	***25.84***	***25.34***	***26.84***	***26.34***	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	.....
Buffalo	24.00	23.00	25.00	24.50	29.50
Cincinnati	***24.44***	***24.61***	.....	***25.11***	.....
Canton, Ohio	***25.39***	***24.89***	***25.89***	***25.39***	.....
Mansfield, Ohio	***25.94***	***25.44***	***26.44***	***25.94***	.....
St. Louis	***24.50***	***24.02***	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....
Cleveland	24.00	23.50	24.50	24.00	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....
Toledo	24.00	23.50	24.50	24.00	.....
Youngstown††	24.00	23.50	24.50	24.00	.....
Detroit	24.00	23.50	24.50	24.00	.....
St. Paul	***26.63***	.....	***27.13***	***26.63***	.....
Duluth	24.50	.....	25.00	24.50	.....
Birmingham	20.38	19.00	25.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce.....$23.50

CHARCOAL

Lake Superior fce.....$28.00
Delivered Chicago 31.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

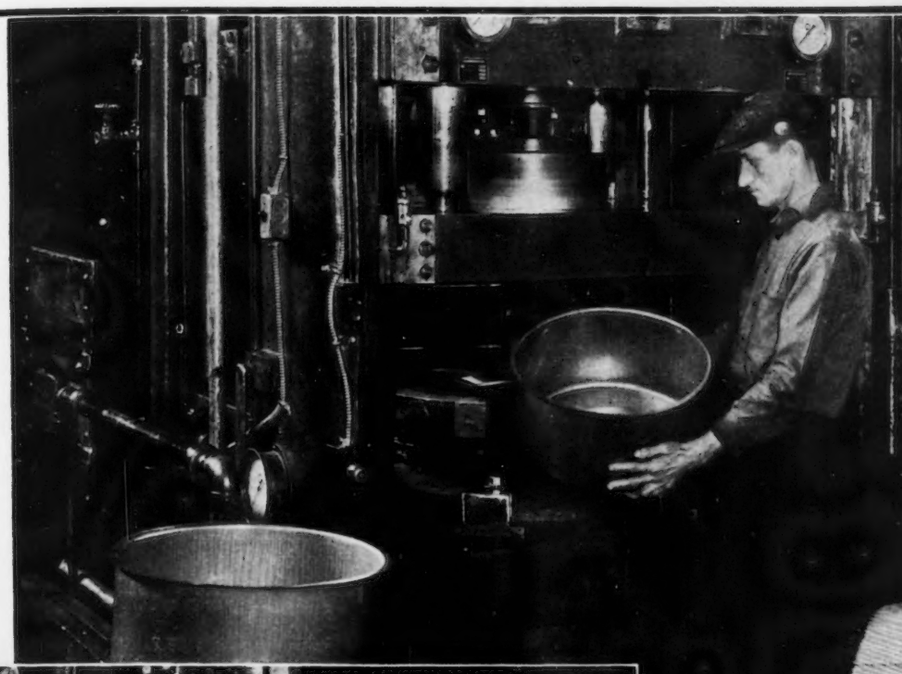
††Pittsburgh Coke & Iron and Struthers furnaces are quoting $24.50 a ton for No. 2 foundry, basic and malleable, and $25.00 a ton for bessemer iron at Sharpsville and Youngstown.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.12	4.35	4.23	6.50
Sheets, galvanized	4.75	4.60	4.62	5.00	5.00	4.84	4.75	5.11	4.75	4.24	4.75	4.98	5.25
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	4.99	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.52	3.46	....	3.61	3.83	3.54	...
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.15
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.15
Bars cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	9.55
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	10.55
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.55

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions; Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 6 bundles. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43.

No Rejects . . .
when Drawing Monel Tubs with
H-P-M BLANKHOLDER PRESSES



Three years ago this H-P-M hydraulic press was installed at Acklin Stamping Co., Toledo, Ohio. It handles all their diversified deep drawing jobs. » »

1st DRAW
17" DIAM.- 9" DEEP

2nd DRAW
15" DIAM.- 11" DEEP

DO YOU HAVE AN OVERSIZE SCRAP PILE?

Can You Answer YES to These Questions?

1. **Are you using only one or two blanks during die tryouts?**
2. **Does your draw punch slow-down before contacting blank, eliminating metal fracture?**
3. **Is your die maker building your dies exactly to engineering standards?**
4. **When drawing jobs that are not symmetrical, can you vary blankholder pressure at various points on the blankholder ring without shimming dies?**
5. **Are you successfully coining the drawn piece at the bottom of the press stroke?**

The answer is always YES when you employ H-P-M FASTRAVERSE BLANKHOLDER PRESSES. We will gladly explain why. Write.

THE HYDRAULIC PRESS MFG. CO.

Mount Gilead, Ohio, U. S. A.

District Sales Offices: New York, Syracuse, Detroit and Chicago

Representatives: Akron, Atlanta, Birmingham, Boston, Cincinnati, Cleveland, Houston, Los Angeles, Omaha, Pittsburgh, San Francisco, Seattle, St. Louis, Washington, D C.

Foreign Representatives: Canada and England

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **International Equipment Corp.**, 352 Western Avenue, Brighton, Boston, laboratory centrifuges and other machine equipment, has let general contract to George B. H. Macomber Co., 38 Chauncy Street, Boston, for new one-story plant, 103 x 193 ft. Cost over $85,000 with equipment.

Plaskon Co., Inc., 2112 Sylvan Avenue, Toledo, Ohio, plastic molding products, has asked bids on general contract for new three-story and basement branch plant, 200 x 300 ft., at Danbury, Conn. Cost about $750,000 with equipment. Lockwood Greene Engineers, Inc., 10 Rockefeller Plaza, New York, is architect and engineer.

Public Works Officer, Naval Training Station, Newport, R. I., asks bids until June 4 for boilers, pumps, automatic feed water regulators, soot blowers, boiler meters, recording and indicating instruments, differential feed water regulators, piping, flow meters, etc., for power house at local station, also for removal of two existing boilers and two boiler feed pumps (Specification 10334).

Goodyear Tire & Rubber Co., Akron, Ohio, is remodeling and improving branch mill at New Bedford, Mass., for production of bullet-seal gasoline tanks, pneumatic boats, barrage balloons and kindred specialties. Mill heretofore given over to tire fabrics and equipment has been removed. Facilities will be provided for force of over 800 persons.

Public Works Officer, Navy Yard, Portsmouth, N. H., asks bids (no closing date stated) for elevated water storage tank, with piping and control house at local yard (Specification 10385).

Allen Mfg. Co., 133 Sheldon Street, Hartford, Conn., hollow set screws, pipe plugs, dowel pins, etc., has approved plans for two-story addition, superstructure to begin at once. Cost close to $40,000 with equipment.

Bakelite Corp., 30 East Forty-second Street, New York, plastic molded products, has let general contract to W. L. Blanchard Co., 45 Poinier Street, Newark, N. J., for two-story addition, 30 x 130 ft., to plant at Bound Brook, N. J. Cost about $85,000 with equipment. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects and engineers.

General Electric Co., Schenectady, N. Y., has let general contract to James E. Lowe & Sons, Inc., 243 State Street, for one-story shop addition, 60 x 340 ft. Cost over $100,000 with equipment.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until June 2 for 25 diesel engine-driven power units, seven tool sets, seven oil reclaimers (Circular 645).

Royal Typewriter Co., 2 Park Avenue, New York, has leased building No. 4, about 13,000 sq. ft. floor space, at former works of New Departure Mfg. Co., West Hartford, Conn., for expansion in Hartford plant.

Grand City Container Corp., 622 West Fifty-seventh Street, New York, corrugated boxes and containers, will take bids soon on general contract for new plant on 15-acre tract at North Bergen, N. J., consisting of a main one and two-story unit, 300 x 800 ft., with boiler house and auxiliary structures. Cost over $700,000 with equipment. Ely Jacques Kahn and Robert Allan Jacobs, 2 Park Avenue, New York, are architects.

Bruening-Winans Corp., 205 St. Paul Street, Rochester, N. Y., machinery and parts, plans expansion for production of airplane parts for Government, comprising one-story building and equipment to cost about $93,500. Fund will be provided by Defense Plant Corp., Washington.

Revere Copper & Brass, Inc., Rome Mfg. Co. division, Rome, N. Y., welded steel and other metal tubing, etc., has let general contract to Zingerline Brothers, 124 Fourth Street, for one-story addition. Cost close to $50,000 with equipment.

American Can Co., 230 Park Avenue, New York, has let general contract to Turner Construction Co., 420 Lexington Avenue, for new boiler house at plant at Geneva, N. Y. Cost over $60,000 with equipment.

Air Associates, Inc., Bendix Airport, Bendix, N. J., aircraft equipment, has leased for expansion Fokker Aircraft Co. plant at Bendix, previously used by Government. Company will manufacture aircraft accessory equipment for Government, comprising part of an expansion program now being carried out. Defense Plant Corp., Washington, Federal agency, will provide fund of $311,700 for project.

Art Tube Co., 500 Lyons Avenue, Irvington, N. J., collapsible metallic tubing, has let general contract to Damon G. Douglas Co., 605 Broad Street, Newark, N. J., for one-story addition, about 25 x 300 ft. Cost close to $100,000 with equipment. Raymond B. Flatt, 50 Broad Street, Bloomfield, N. J., is architect.

Hanovia Chemical & Mfg. Co., 233 New Jersey Railroad Avenue, Newark, N. J., has let general contract to Wininger, Selby & Herrick, Inc., 152 West Forty-second Street, New York, for two-story and basement addition, 50 x 100 ft. Cost over $65,000 with equipment. Epple & Kahrs, 17 Washington Street, Newark, are architects.

National Oil Products Co., Essex Street, Harrison, N. J., refined oil products, has let general contract to Wright & Lopez Co., Cedartown, Ga., for two-story addition to branch mill at Cedartown, about 100 x 130 ft. Cost close to $85,000 with equipment.

Constructing Quartermaster, Fort Dix, N. J., asks bids until June 2 for new ordnance shop, warehouses and other buildings at camp.

Clayton W. Wylam, Philadelphia, has purchased one-story building at 3301-15 North Nineteenth Street for new plant for production of pressed steel products.

Bisbee Linseed Co., Lincoln-Liberty Building, Philadelphia, linseed oil and allied products, has let general contract to A. Bowen Co., 1110 Edgewood Road, Brookline, Pa., for one-story addition, about 155 x 160 ft. Cost close to $100,000 with equipment.

Birdsbro Steel Foundry & Machine Co., Birdsboro, Pa., has let general contract to Charles H. Schwertner, 1505 Race Street, Philadelphia, for one-story addition, 82 x 300 ft., for expansion in foundry. Cost over $125,000 with equipment. Day & Zimmerman, Inc., Packard Building, Philadelphia, is architect and engineer.

Constructing Quartermaster, Delaware Ordnance Depot, Pedricktown, N. J., asks bids until June 5 for one-story packing and shipping warehouse.

Pusey & Jones Corp., Front and Poplar Streets, Wilmington, Del., plans expansion in shipbuilding plant on Christina River, including new shipways, about 500 ft. long, and other structures. Cost over $300,000. Negotiations are under way with city for acquisition of land for project.

Northern Equipment Co., 1945 Grove Street, Erie, Pa., valves, governors, boiler feed water regulators and kindred equipment, has asked bids on general contract for one-story addition. Cost over $50,000 with equipment.

United States Engineer Office, Post Office Building, Pittsburgh, asks bids until June 2 for two 15,000-gal. per min., vertical propeller-type pumps, with electric motors, flap valves, float switch, etc. (Circular 543).

General Purchasing Officer, Panama Canal, Washington, asks bids until June 2 for steel machine bolts, steel carriage bolts, galvanized steel deck bolts, brass machine and expansion bolts, round plate washers, steel rivets, steel lag screws, iron or steel expansion shields, cast iron ogee washers, etc. (Schedule 5117), 200,000 lb. steel track spikes, 10,000 ft. of galvanized coil chain, 4500 lb. of steel wool (Schedule 5129).

Bethlehem Steel Co., Ship Building Division, Sparrows Point, Baltimore, has let general contract to Consolidated Engineering Co., 20 East Franklin Street, for addition to drydock control station. Cost over $50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 3 for 10 motor-driven drill grinders for Brooklyn, Philadelphia, Portsmouth, N. H., Puget Sound, Wash., and Charleston, S. C., Navy yards, and for three motor-driven drill point thinning machines, bench-type, for Brooklyn (Schedule 6879), 500,000 miniature practice bombs (Schedule 6815), centrifugal-type ventilating fans and spare parts, and propeller-type ventilating fans and spare parts (Schedule 6849) for Eastern and Western yards.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for shop and garage equipment and tools for mechanical department at local naval medical center (Specification 10339).

Production Tool & Die Co., Inc., 562 St. James Avenue, Springfield, Mass., has awarded a contract to Leo B. DeBlois, 103 Pleasant Avenue, Longmeadow, Mass., for a machine shop.

Fitchburg Grinding Machine Corp., Walnut Street, Fitchburg, Mass., has awarded contract to B. A. Stephens Co., Fitchburg, for a manufacturing plant.

The South

• **Tampa Shipbuilding Co., Inc.**, Tampa, Fla., has low bid from Albert Haworth, 628 Raymond Avenue, at $136,584 for one-story shop, exclusive of equipment, primarily for a mold loft. This is part of expansion program for construction of vessels for Government, for which loan of about $2,000,000 was secured recently through RFC.

Helena Manganese Cooperative Producers' Association, Helena, Ark., Arthur Lorch, president, plans new processing plant for handling low-grade manganese ores. Cost over $85,000 with equipment.

United States Engineer Office, Mobile, Ala., asks bids soon for one-story five-unit warehouse at local Brookley field, 180 x 600 ft.

Louisiana Shipyards, Inc., New Orleans, has let contract to R. P. Farnsworth & Co., 1515 North Salcedo Street, for foundations and other work in connection with two shipways for shipbuilding plant for construction of vessels for Government. Company also has plans for one-story machine and structural shops, welding works, assembling shop and for other mechanical service. New yard will be located on Industrial Canal and will cost about $4,481,000, fund to be secured through Maritime Commission, Washington. J. G. White Engineering Corp., New York, and Hibernia Building, New Orleans, is consulting engineer. N. O. Pedrick is president of company, recently organized.

United States Engineer Office, Denison, Tex., will receive bids on or about June 10 for buildings for aviation mechanics' school at Wichita Falls, Tex., including boiler house, pumping station and water storage tanks, 10 steel air corps hangars and miscellaneous structures.

Emsco Derrick & Equipment Co., Garden

Villas, Houston, Tex., oil well equipment and supplies, oil rigs, etc., has let general contract to Mosher Steel Co., 3910 Washington Street, for one-story addition, 50 x 325 ft. Cost close to $125,000 with equipment.

Metals Reserve Corp., Washington, subsidiary of RFC, has closed contracts with Ford, Bacon & Davis, Inc., 39 Broadway, New York, engineer and contractor, for new tin smelting plant at Texas City, Tex., including furnaces, power plant, shops and other buildings, ore and finished material storage and distributing facilities. Another contract has been made with Tin Processing Corp., 10 Rockefeller Plaza, New York, for operation of plant, entire output to be used by Government. Cost over $10,000,000.

Stanolind Oil & Gas Co., Gulf Building, Houston, Tex., plans new recycling plant for natural gasoline production at La Fayette, Tex., consisting of several production units, compressor station, boiler house, machine shop and auxiliary structures, with steel tank storage units. Cost over $400,000 with equipment.

Central States

• **Wellman Engineering Co.**, 7000 Central Avenue, Cleveland, steel mill and other heavy machinery, has let general contract to Albert M. Higley Co., 2036 East Twenty-second Street, for two one-story additions, 45 x 95 ft., for expansion in machine shop, and 40 x 65 ft., for storage and distribution. Cost close to $50,000 with equipment.

Youngstown Steel Car Corp., Niles, Ohio, mine and industrial cars, pressed steel parts, has approved plans for one-story addition. Cost close to $150,000 with equipment.

Buckeye Forging Co., 10003 Harvard Boulevard, Cleveland, drop forgings, flanges for tanks and barrels, has let general contract to Mark Swisher, 1935 Euclid Avenue, for one-story addition, 40 x 110 ft. Cost over $60,000 with equipment. Christian, Schwarzenberg & Gaede, 1836 Euclid Avenue, are architects and engineers.

Eastern Machinery Co., 1000 Tennessee Avenue, Cincinnati, machine tools and parts, has asked bids on general contract for one-story addition, 68 x 140 ft. Cost close to $85,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects.

Ohio Crankshaft Co., 6600 Clement Avenue, Cleveland, plans expansion for production of diesel engine parts for Navy Department, including one-story addition and equipment. Cost about $1,720,000. Fund in that amount is being secured through Defense Plant Corp., Washington.

Falcon Bronze Co., Hazel Street, Youngstown, bronze, brass and other metal castings, has acquired one-story adjoining building, and will improve for expansion.

Efficient Tool & Die Co., 9314 Elizabeth Avenue, Cleveland, has let general contract to Boldt-Rapp Co., 4404 Pershing Avenue, for one-story addition, 40 x 106 ft. Cost close to $45,000 with equipment. Herman W. Maurer, 3126 Scarborough Road, is architect.

Perfection Screw Products Co., 1112 Springdale Place, Indianapolis, screw machine products, has let general contract to Robert L. Mason, 5380 Graceland Avenue, for new one-story plant, 45 x 150 ft. Cost close to $50,000 with equipment. H. L. Simmons, 5151 North Meridian Street, is architect.

Coca-Cola Bottling Co., Inc., La Porte, Ind., has let general contract to William P. Jungclaus Co., 825 Massachusetts Avenue, Indianapolis, for new two-story and basement mechanical-bottling, storage and distributing plant, 105 x 185 ft. Cost close to $90,000 with equipment. Philip Weisenburgh, Architects' and Builders' Building, Indianapolis, is architect.

Kansas Power & Light Co., Topeka, Kan., has approved plans for multi-story addition to steam-electric generating plant, 50 x 80 ft., for expansion in steam department, including boiler and auxiliary equipment. Cost over $100,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Midwest Piping & Supply Co., Inc., 1450 South Second Street, St. Louis, pipe coils and bends, pipe welding, etc., has let general contract to Fruin-Colnon Contracting Co., Merchants' Laclede Building, for one-story addition, 80 x 101 ft. Cost over $60,000 with equipment.

Water Department, City Hall, Kansas City, Mo., K. K. King, director, plans equipment maintenance, storage and distributing plant on Eighteenth Street, with two-story service, repair and garage building for department trucks and cars. Cost about $300,000 with equipment. It is proposed to begin work in July.

Chrysler Corp., Detroit, has let general contract to O. W. Burke Co., Fisher Building, for one-story addition to plant on Lynch Road, for expansion in forge and die shop. Cost over $100,000 with equipment. Bids have been asked on general contract for one-story addition to plant on Wyoming Avenue, for extensions in press shop; and for one-story addition to plant on Jefferson Avenue, for expansion in machine shop. Albert Kahn Associated Architects & Engineers, Inc., New Center Building, is architect and engineer. This is part of expansion program for production of equipment for Government, including recent agreement with Defense Plant Corp., Washington, for fund of $753,974 for equipment and facilities for production of aluminum forgings.

A. Harold Frauenthal, South Bend, Ind., formerly vice-president of Bantam Bearing Co., South Bend, and associates, have organized company to manufacture aircraft parts, bearings and allied products. Former buildings of Austin Machinery Co., Muskegon, Mich., have been acquired and will be improved, with facilities for initial employment of about 200 persons.

Mueller Brass Co., Port Huron, Mich., brass, copper and other metal products, has asked bids on general contract for one-story addition, 50 x 110 ft. Cost close to $60,000 with equipment. H. E. Beyster Corp., General Motors Building, Detroit, is architect and engineer.

Nash-Kelvinator Corp., 14250 Plymouth Street, Detroit, electric refrigerators and parts, etc., has contracted with Government for production of aircraft propellers and propeller hubs, and will occupy part of former plant of Reo Motor Car Co., Lansing, Mich., totaling about 400,000 sq. ft. floor space, recently acquired by Defense Plant Corp., Washington, and which will provide fund of $7,958,800 for modernization and equipment. Facilities will be provided for about 2500 employees.

Sjostrom & Sons, Inc., 1617 Crosby Street, Rockford, Ill., mechanical equipment and parts, plans new one-story machine shop at Prophetstown, Ill., 120 x 320 ft. Cost about $85,000 with equipment.

Sheldon Machine Co., 1624 North Kilbourn Avenue, Chicago, arbor presses, lathes and other tools, has let contract to Clearing Industrial District, 6455 South Central Avenue, for new one-story plant at 4705 West Montrose Avenue. Cost over $60,000 with equipment. J. S. Cromelin, 6455 South Central Avenue, is architect.

Commercial Metal Products Co., 2251 West St. Paul Avenue, Chicago, lighting fixtures, spun and stamped metal goods, etc., plans one-story top addition to present one-story plant, 100 x 125 ft. Cost over $75,000 with equipment. Cohen & Kogen, 612 North Michigan Avenue, are architects.

Magnus Metal Division, National Lead Co., 125 East Greenfield Avenue, Milwaukee, has let general contract to Campbell-Lowrie-Lautermilch Corp., 400 West Madison Street, Chicago, for new one-story foundry, 134 x 278 ft., on West State Street, Milwaukee. Cost over $150,000 with equipment. Olsen & Urbain, 8 East Huron Street, Chicago, are architects. Main offices of parent company are at 111 Broadway, New York.

Northwest Engineering Corp., Howard Street, Green Bay, Wis., cranes, draglines and other heavy machinery, has let general contract to Selmer Co., Northern Building, for two-story addition, 20 x 240 ft., for expansion in structural shop and other production divisions. Cost about $75,000 with equipment.

Vaughan Novelty Mfg. Co., Inc., 3211 West Carroll Avenue, Chicago, can openers, metal novelties, etc., has let general contract to Emil Anderson & Son, 3659 Belle Plaine Avenue, for two-story addition, 31 x 145 ft., for expansion in machine shop. Cost over $60,000 with equipment. L. G. Hallberg, 221 North La Salle Street, is architect.

Western States

• **Pacific Foundry Co., Ltd.**, 3100 Nineteenth Street, San Francisco, iron and other metal castings, plans one-story addition. Cost close to $75,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, plans expansion in pattern shop and storage buildings, and utility and transportation shops at Mare Island Navy Yard, Cal. Cost about $140,000. Appropriation in that amount is being arranged. Public Works Officer, same yard, asks bids (no closing date stated) for electrical services for dry dock No. 4, and connecting quay walls between dry docks Nos. 2 and 3, including motor-generator switchgear, transformers, cables, etc. (Specification 10439).

Gilro Machine & Stamping Co., 2915 Ford Street, Oakland, Cal., metal stampings, machined metal goods, etc., plans one-story addition. Cost close to $50,000 with equipment.

Tacoma Western Boat Building Co., Tacoma, Wash., is arranging for purchase of plant and property of Vermont Marble Works, Inc., 1120 East D Street, for new shipbuilding plant, including two shipways, docks, shops and auxiliary buildings. Cost close to $300,000 with equipment.

Board of Education, Pasadena, Cal., has asked bids on general contract for one-story vocational foundry on west campus, Pasadena Junior College, 195 Lincoln Avenue. Cost close to $40,000 with equipment. Cyril J. Bennett, First Trust Building, is architect.

California Packing Co., 909 West Ninth Street, Vancouver, Wash., canner and food packer, has awarded general contract to Reimers & Jolivette, Railway Exchange Building, Portland, Ore., for two-story addition, 85 x 120 ft., for expansion in processing and canning departments. Cost over $85,000 with equipment.

Coca-Cola Bottling Co., 1334 South Central Avenue, Los Angeles, has asked bids on general contract for new one-story mechanical-bottling plant at Venice, Cal. Cost close to $50,000 with equipment. Robert V. Derrah, 9470 Santa Monica Boulevard, Beverly Hills, Cal., is architect.

Canada

• **Border Cities Industries, Ltd.**, Toronto, recently organized subsidiary of General Motors Corp. of Canada, Ltd., 68 Richmond Street East, has arranged with Department of Munitions and Supply, Ottawa, for operation of plant to be built by Department at Windsor, Ont., for production of anti-aircraft machine guns, and will supervise erection and equipment installation. Bids are being asked for erection, consisting of several one and multi-story buildings, to cost close to $8,000,000.

Standard Machine Tool Co., Ltd., Windsor, Ont., plans one-story addition. Cost close to $65,000 with equipment.

William Kennedy & Sons, Ltd., 1114 First Avenue West, Owen Sound, Toronto, iron and steel products, has let general contract to Woolwich & Clark Co., Ltd., 1099 Avenue E, for one-story addition, about 60 x 155 ft. Cost over $75,000 with equipment. Ewart, Armer & Byam, Excelsior Life Building, are engineers.

Products Index

WHO MAKES IT

Here you find a weekly listing of hundreds of products with the names and addresses of manufacturers. The advertisements of these companies appear in The Iron Age.

ABRASIVE CLOTH & PAPER
Carborundum Co., The Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ABRASIVES—Polishing
Abrasive Co., Philadelphia, Pa.
Carborundum Co., The Niagara Falls, N. Y.
General Abrasive Co., Inc., Niagara Falls, New York.
Siefen, J. J. Co., Detroit, Mich.

ABRASIVES—Steel Shot and Grit
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Harrison Abrasive Corp., Manchester, N. H.
Pangborn Corporation, Hagerstown, Md.
Pittsburgh (Pa.) Crushed Steel Co.
Steel Shot & Grit Co., Boston, Mass.

ACCUMULATORS
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.
Morgan Engineering Co., The, Alliance, Ohio.
Wood, R. D., & Co., Philadelphia, Pa.

ACETYLENE
Air Reduction, 60 East 42nd St., N.Y.C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

ALLOYS—Bismuth
Cerro De Pasco Copper Corp., 44 Wall St., New York City.

ALLOYS—Copper
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Milwaukee, Wis.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

ALLOYS—Corrosion & Abrasion Resistant
Coast Metals, Inc., Canton, Ohio.
Wall-Colmonoy Corp., Detroit, Mich.

ALLOYS—See Ferroalloys

ALLOYS—Low Melting Matrix
Cerro De Pasco Copper Corp., 44 Wall St., New York City.

ALLOYS—Magnesium
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ALLOYS—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Milwaukee, Wis.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.

ALUMINUM
Aluminum Co. of America, Pittsburgh.

ANGLES, BEAMS, CHANNELS AND TEES
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp Subsidiary), San Francisco, Calif.
Concord Steel Corp., 19 Rector St., N. Y. C.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.
Holliday, W. J., & Co., Hammond, Ind.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T. & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

ANNEALING BOXES
Lebanon (Pa.) Steel Foundry.
United Engineering & Fdry. Co., Ptgh.

ARBORS
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ASBESTOS
Carey, Philip, Co., The, Cincinnati, Ohio.
Johns-Manville Corp., 22 East 40th St., N. Y. C.

BABBITT METALS
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.
National Bearing Metals Corp., Pittsburgh, Pa.
National Lead Co., 111 Bdway., N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BALANCING EQUIPMENT
Gisholt Machine Co., Madison, Wis.
Sundstrand Machine Tool Co., Rockford, Ill.

BALING PRESSES
Baldwin-Southwark Div., Baldwin Locomotive Wks., Phila., Pa.
McKay Machine Co., The, Youngstown, Ohio.

BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The

BALLS, Steel
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Fafnir Bearing Co., The, New Britain, Conn.
Hartford (Conn.) Steel Ball Co., The.
McIntyre Machine Works, Hartford, Conn.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BARRELS—Burnishing & Tumbling
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Whiting Corp., Harvey, Ill.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
American Brass Co., The, Waterbury, Conn.
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Crucible Steel Co. of America, Chrysler Bldg., New York City.
Holliday, W. J., & Co., Hammond, Ind.
Jones & Laughlin Steel Corp., Pittsburgh.
Kidd Drawn Steel Co., Aliquippa, Pa.
Monarch Steel Co., Indianapolis, Ind.
Rathbone, A. B. & J., Palmer, Mass.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

BARS—Concrete, Reinforcing
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Nicetown Plate Washer Co., Inc., Philadelphia.
Republic Steel Corp., Cleveland, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Wickwire Brothers, Inc., Cortland, New York.

BARS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Steel
Andrews Steel Co., The, Newport, Ky.
Beals-McCarthy & Rogers, Inc., Buffalo, New York.
Bethlehem (Pa.) Steel Company.
Brown-Wales Co., Boston, Mass.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Concord Steel Corp., 19 Rector St., N. Y. C.
Copperweld Steel Co., Warren, Ohio.
Crucible Steel Co. of America, Chrysler Bldg., New York City.
Great Lakes Steel Corp., Ecorse, Detroit
Holliday, W. J., & Co., Hammond, Ind.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh
Midvale Co., The, Nicetown, Phila., Pa.
Monarch Steel Co., Indianapolis, Ind.
Potts, Horace T., Co., Philadelphia, Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Tuteln Corp., 230 Park Ave., New York City.
Youngstown (Ohio) Sheet & Tube Co., The

BATTERIES—Storage
Edison Storage Battery Div. of Thomas A. Edison, Inc., West Orange, N. J.
Electric Storage Battery Co., The, Phila.
Philco, Battery Div., Phila., Pa.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles

BEARINGS—Babbitt
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BEARINGS—Ball
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
McIntyre Machine Works, Hartford, Conn.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Torrington (Conn.) Company.

BEARINGS, Brass and Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., Pittsburgh.
Shenango-Penn Mold Co., Dover, Ohio.

BEARINGS—Needle
Bantam Bearings Corp., The, South Bend, Ind.
Torrington (Conn.) Company.

BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, O.
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BEARINGS—Roll Neck
Bantam Bearings Corp., The, South Bend, Ind.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 North Holmes Ave. Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment
Bantam Bearings Corp., The, South Bend, Ind.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Shaft Hanger
Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., The, New Britain, Conn.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Medart Co., The, St. Louis, Mo.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BEARINGS—Thrust
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Timken Roller Bearing Co., The, Canton, O.

BELT—Conveyor, Elevator
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

BELTING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Houghton, E. F., & Co., Philadelphia, Pa.

BELTING—Metal, Conveyor, High and Low Temperature
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

BELTING—Rubber
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

BELTS—V-Type
Allis-Chalmers Mfg. Co., Milwaukee.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

BENCH LEGS—Steel
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

BENCHES—Steel Work
Standard Pressed Steel Co., Jenkintown, Pa.

BENDING MACHINES—Hand, Band and Angle
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

BENDING MACHINES
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co., The, Steelweld Mchry. Div., 1115 East 283rd St., Wickliffe, Ohio.
Cleveland (Ohio) Punch & Shear Works Co., The.
Dreis & Krump Mfg. Co., Chicago, Ill.
Niagara Machine & Tool Works, Buffalo, N. Y.
Yoder Co., The, Cleveland, Ohio.

BENZOL RECOVERY PLANTS
Koppers Co., Engineering & Construction Div., Pittsburgh.

BERYLLIUM COPPER
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Milwaukee, Wis.

BILLETS—Alloy & Carbon Steel
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company,
Copperweld Steel Co., Warren, Ohio.
Harrisburg (Pa.) Steel Corp.
Holliday, W. J., & Co., Hammond, Ind.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa
Rustless Iron & Steel Corp., Baltimore, Md.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BILLETS—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Republic Steel Corp., Cleveland, Ohio.